SIGNAL

Communications—Electronics—Photography • On Land Sea and Air

Historical Events In Postal Progress

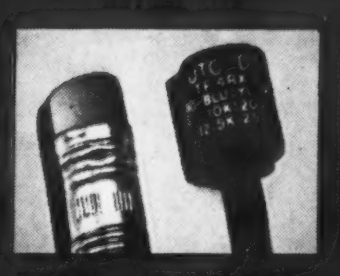
1831	*Train*
1858	*Overland Stage*
1860	*Pony Express*
1918	*Airplane*
1959	*Missile*

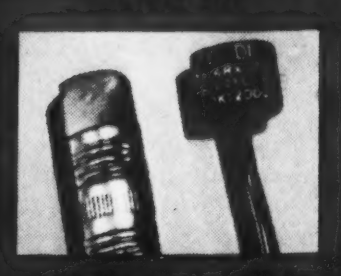
(Upper Left) Postmaster General Arthur E. Summerfield (3rd left), postal officials and commander of the guided missile submarine USS BARBERO, Lt. Cdr. Carlos Dew, USN, watch loading of the first Missile Mail. Later, President Eisenhower receives a missile letter as The Postmaster General observes.

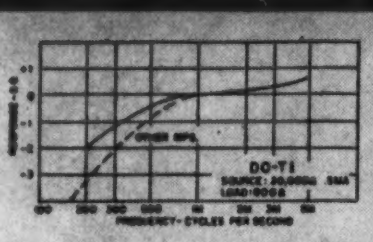
See page 34

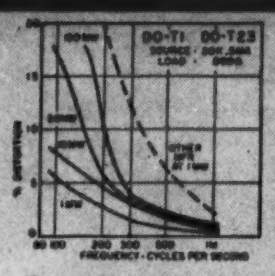
July 1959

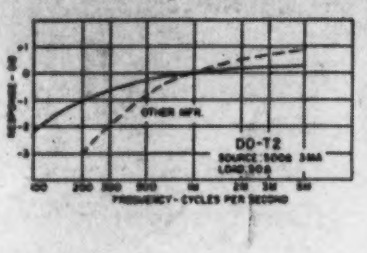
UTC NEW EXPANDED SERIES

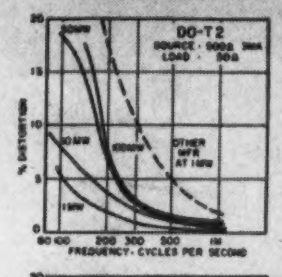


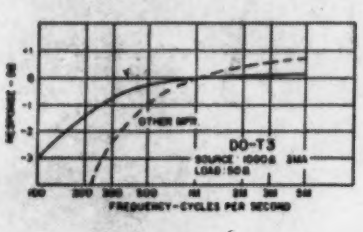


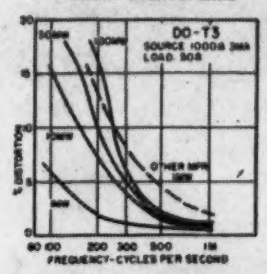


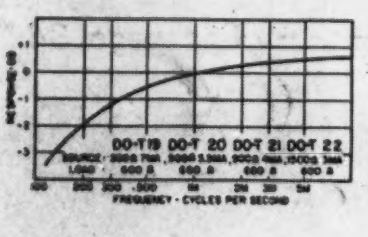


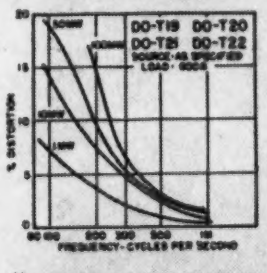


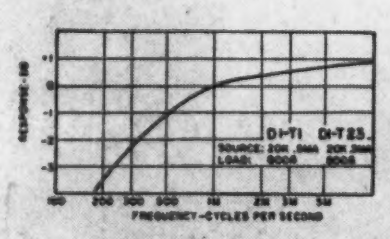


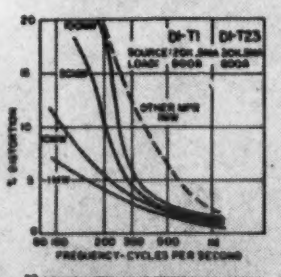


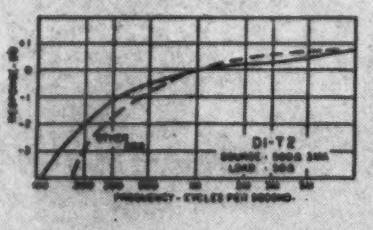


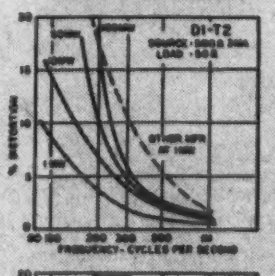


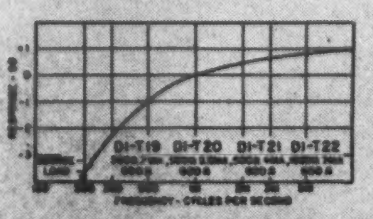


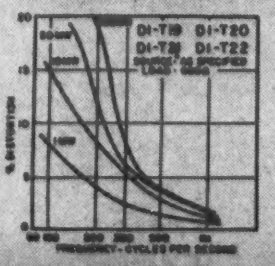












DO-T No.	MIL Type	Application	Pri. Imp.	D.C. Ma.‡ in Pri.	Sec. Imp.	Pri. Res. DO-T	Pri. Res. DI-T	Level Mw.	DI-T No.
DO-T1	TF4RX13YY	Interstage	20,000 30,000	.5 .5	800 1200	850	815	50	DI-T1
DO-T2	TF4RX17YY	Output	500 600	3 3	50 60	60	65	100	DI-T2
DO-T3	TF4RX13YY	Output	1000 1200	3 3	50 60	115	110	100	DI-T3
DO-T4	TF4RX17YY	Output	600	3	3.2	60		100	
DO-T5	TF4RX13YY	Output	1200	2	3.2	115	110	100	DI-T5
DO-T6	TF4RX13YY	Output	10,000	1	3.2	790		100	
DO-T7	TF4RX16YY	Input	200,000	0	1000	8500		25	
DO-T8	TF4RX20YY	Reactor 3.5 Hys. @ 2 Ma. DC, 1 Hy. @ 5 Ma. DC				630			
	TF4RX20YY	Reactor 2.5 Hys. @ 2 Ma. DC, .9 Hy. @ 4 Ma. DC					630		DI-T8
DO-T9	TF4RX13YY	Output or driver	10,000 12,000	1 1	500 CT 600 CT	800	870	100	DI-T9
DO-T10	TF4RX13YY	Driver	10,000 12,000	1 1	1200 CT 1500 CT	800	870	100	DI-T10
DO-T11	TF4RX13YY	Driver	10,000 12,000	1 1	2000 CT 2500 CT	800	870	100	DI-T11
DO-T12	TF4RX17YY	Single or PP output	150 CT 200 CT	10 10	12 16	11		500	
DO-T13	TF4RX17YY	Single or PP output	300 CT 400 CT	7 7	12 16	20		500	
DO-T14	TF4RX17YY	Single or PP output	600 CT 800 CT	5 5	12 16	43		500	
DO-T15	TF4RX17YY	Single or PP output	800 CT 1070 CT	4 4	12 16	51		500	
DO-T16	TF4RX13YY	Single or PP output	1000 CT 1330 CT	3.5 3.5	12 16	71		500	
DO-T17	TF4RX13YY	Single or PP output	1500 CT 2000 CT	3 3	12 16	108		500	
DO-T18	TF4RX13YY	Single or PP output	7500 CT 10,000 CT	1 1	12 16	505		500	
DO-T19	TF4RX17YY	Output to line	300 CT	7	600	19	20	500	DI-T19
DO-T20	TF4RX17YY	Output or line to line	500 CT	5.5	600	31	32	500	DI-T20
DO-T21	TF4RX17YY	Output to line	900 CT	4	600	53	53	500	DI-T21
DO-T22	TF4RX13YY	Output to line	1500 CT	3	600	86	87	500	DI-T22
DO-T23	TF4RX13YY	Interstage	20,000 CT 30,000 CT	.5 .5	800 CT 1200 CT	850	815	100	DI-T23
DO-T24	TF4RX16YY	Input (usable for chopper service)	200,000 CT	0	1000 CT	8500		25	
DO-T25	TF4RX13YY	Interstage	10,000 CT 12,000 CT	1 1	1500 CT 1800 CT	800	870	100	DI-T25
DO-T26	TF4RX20YY	Reactor 6 Hy. @ 2 Ma. DC, 1.5 Hy. @ 5 Ma. DC				2100			
	TF4RX20YY	Reactor 4.5 Hy. @ 2 Ma. DC, 1.2 Hy. @ 4 Ma. DC					2300		DI-T26
DO-T27	TF4RX20YY	Reactor 1.25 Hy. @ 2 Ma. DC, .5 Hy. @ 11 Ma. DC				100			
	TF4RX20YY	Reactor .9 Hy. @ 2 Ma. DC, .5 Hy. @ 6 Ma. DC					105		DI-T27
DO-T28	TF4RX20YY	Reactor .3 Hy. @ 4 Ma. DC, .15 Hy. @ 20 Ma. DC				25			
	TF4RX20YY	Reactor .1 Hy. @ 4 Ma. DC, .08 Hy. @ 10 Ma. DC					25		DI-T28
DO-T29	TF4RX17YY	Single or PP output	120 CT 150 CT	10 10	3.2 4	10		500	
DO-T30	TF4RX17YY	Single or PP output	320 CT 400 CT	7 7	3.2 4	20		500	
DO-T31	TF4RX17YY	Single or PP output	640 CT 800 CT	5 5	3.2 4	43		500	
DO-T32	TF4RX17YY	Single or PP output	800 CT 1,000 CT	4 4	3.2 4	51		500	
DO-T33	TF4RX13YY	Single or PP output	1,060 CT 1,330 CT	3.5 3.5	3.2 4	71		500	
DO-T34	TF4RX13YY	Single or PP output	1,600 CT 2,000 CT	3 3	3.2 4	109		500	
DO-T35	TF4RX13YY	Single or PP output	8,000 CT 10,000 CT	1 1	3.2 4	505		500	
DO-T36	TF4RX13YY	Isol. or Interstage	10,000 CT	1	10000 CT	950	970	500	DI-T36

DO-TSH Drawn Hipermalloy shield and cover for DO-T's, provides 25 to 30 db shielding, for DI-T's **DI-TSH**
‡DCMA shown is for single ended useage (under 5% distortion—100MW—1KC) . . . for push pull, DCMA can be any balanced value taken by .5W transistors (under 5% distortion—500MW—1KC)
*DO-T units have been designed for transistor application only . . . not for vacuum tube service. Pats. Pend.

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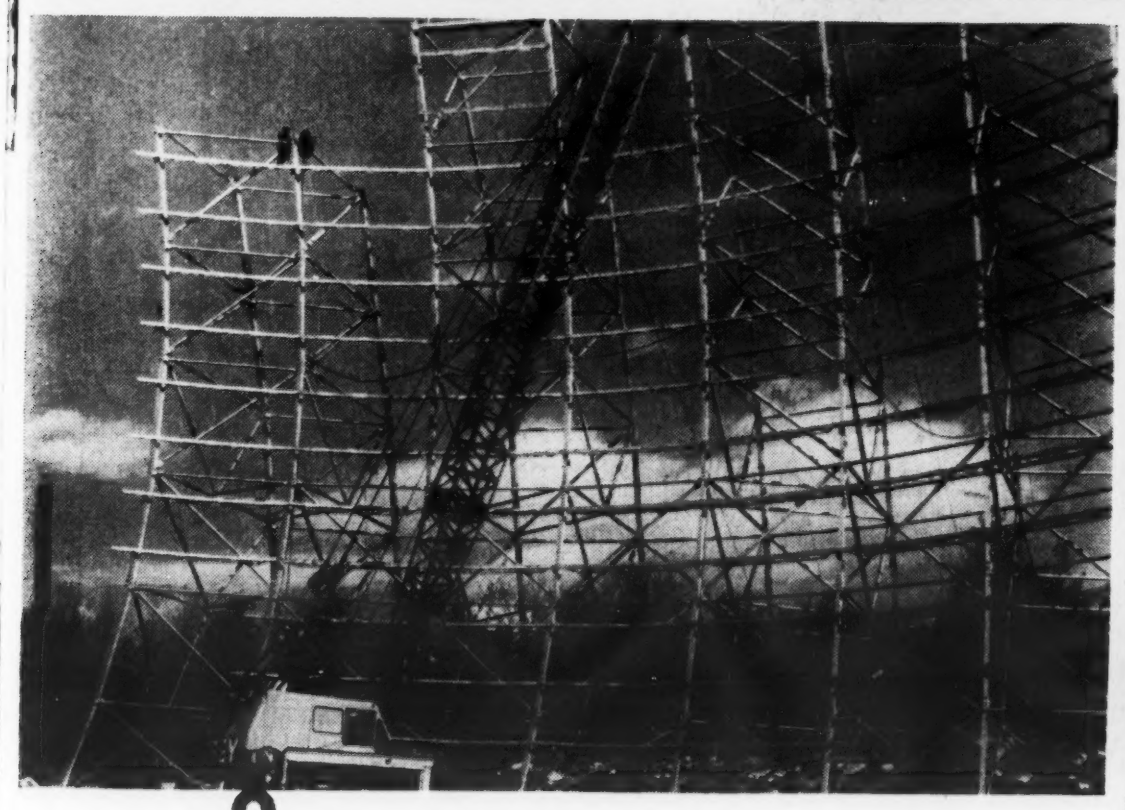
What you should know about

KENNEDY FIELD ENGINEERING SERVICE



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BPA

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Communications-Electronics-Photography

Journal of the Armed Forces Communications and Electronics Association

VOLUME XIII JULY 1959 NUMBER 11

CONTENTS

DEPARTMENTS

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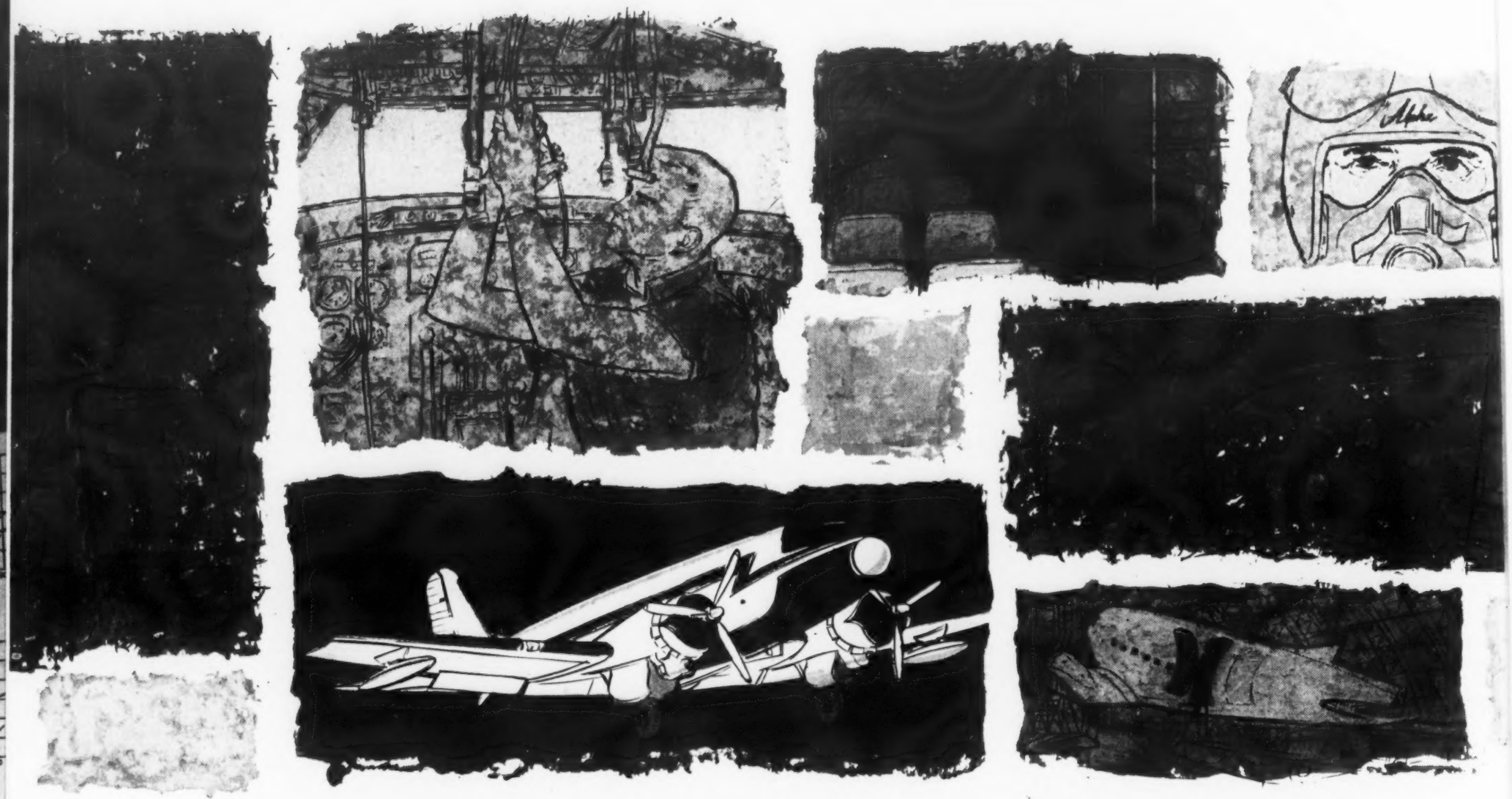
AIRCRAFT MODIFICATION



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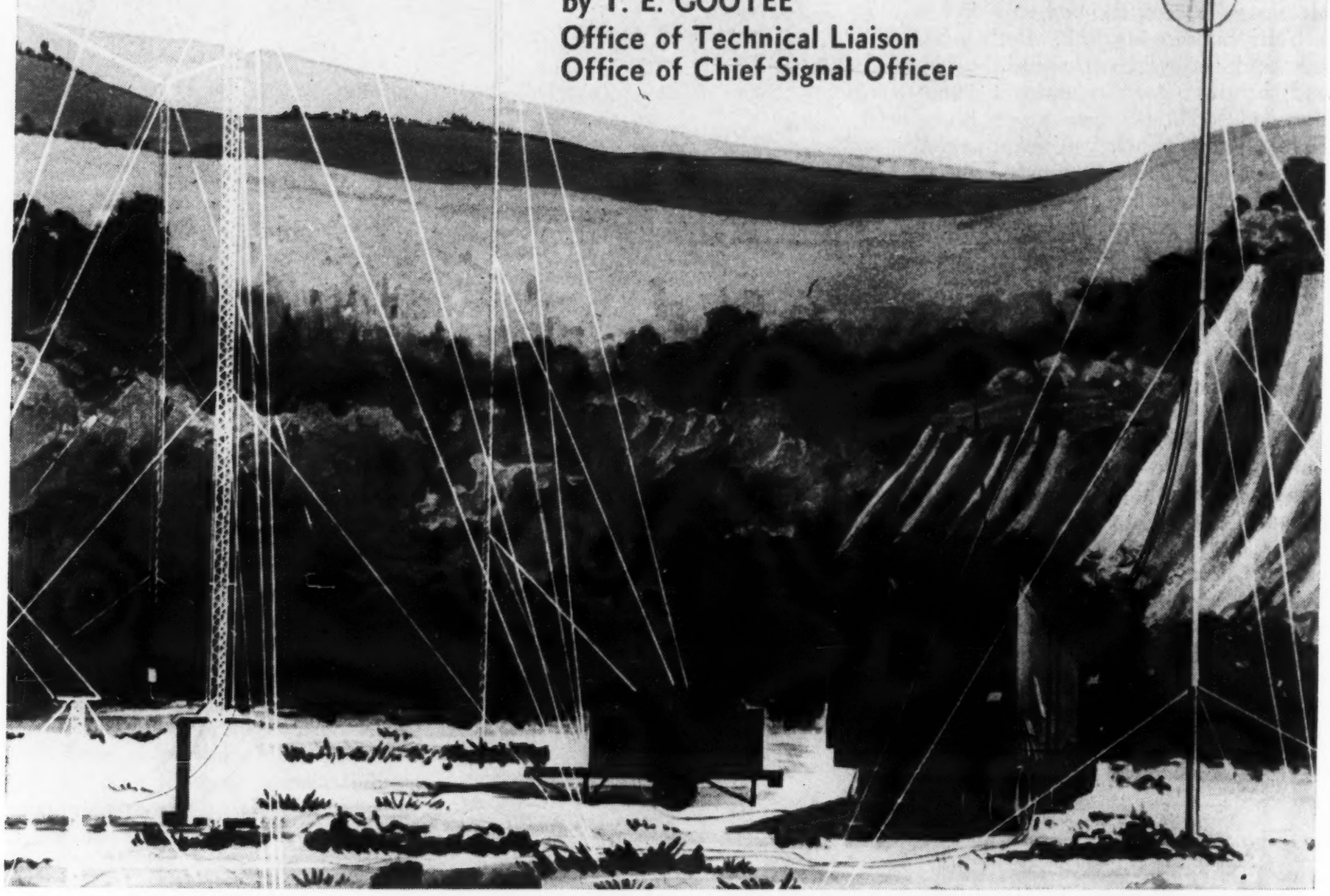
new mobile units of army signal corps provide vital, strategic communications

by T. E. GOOTÉE
Office of Technical Liaison
Office of Chief Signal Officer



Transmitting site of typical AN/TSC-16 installation, showing rhombic antenna (left), power unit, transmitter van, and u-h-f relay antennas (right).

THE NEWEST IN Army strategic communications is the AN/TSC-16 communications central—a versatile system with a long-range fixed-station capability, a high-speed system that provides 18 communication channels, a fire-brigade system that is mobile and air transportable.

Shown publicly at the AFCEA Convention in Washington in June, the new communications system was developed to meet quick-reaction demands of small wars and brush-fire combat operations in trouble spots around the world.

Providing more voice and teletypewriter channels than ever before available in a high-speed mobile communications central, the AN/TSC-16 gives U. S. Army combat commanders a communication capability previously possible only with large, fixed radio installations.

With an operational range of 1,000 to 2,000 miles, the equipment links a field commander directly with the Army's global communication system: the Army Command and Administrative Network or ACAN.

An AN/TSC-16 with a task force in Southeastern Asia, for example. could join the Army's world-wide network at points in Okinawa, Japan, the Philippines, or even Hawaii. Through any of these relay points, the commander of such a task force could talk directly with members of the Army Staff in Washington, D. C. The additional channels provided by the equipment could simultaneously handle other operational messages.

This communications central is vitally important to commanders of STRAC (Strategic Army Corps) units. Designed for fire-brigade operation, the central can accompany commanders into critical areas and give them almost immediate and valuable communications with their Army headquarters.

For the first time, a task force

commander will have, accompanying him into action, a *strategic* radio communications system essentially equal to a large, fixed, global communications equipment.

The AN/TSC-16 central consists of two large vans, each with its tractor and its power-supply trailer. The *Transmitter Van* contains a 10-kw transmitter with facilities for simultaneous transmission on both the upper and lower sidebands. The *Receiver-Comcenter Van* has expansible sides and contains all of the terminal equipment. On site, the two vans are located about a mile apart. Communications between the two vans is by a UHF radio relay link. Both vans are equipped with air conditioning and heating, test equipment, and storage facilities for more than 15,000 items. Each van is powered by a dual 30kw trailer-mounted diesel generator set. Each power unit is a directly coupled a-c generator. The tubular frame of each power trailer serves as the fuel tank.

The system—with 46 operating personnel—can assemble, load into three C-124 aircraft, and be airborne within 12 hours. On arrival, the communications central can be ready for interim operation in about four hours, but longer time is required to erect an efficient rhombic antenna for full-capacity operation.

Keeping pace with today's fast-moving U. S. Army forces, the system provides a combat commander with two voice channels for separate conversations, and as many as 16 teletypewriter channels. A facsimile facility can be substituted for one of the voice command channels; an additional radio voice channel is available for technical or operator's service messages.

Col. George P. Sampson, Chief, Army Communications Service Division, Office of the Chief Signal Officer (left), Alfred Strogoff, Vice President, Adler Electronics Corp. (center) and Benjamin Adler, President, Adler Electronics (right), hold an informal discussion following the official Dept. of the Army press briefing on AN/TSC-16.

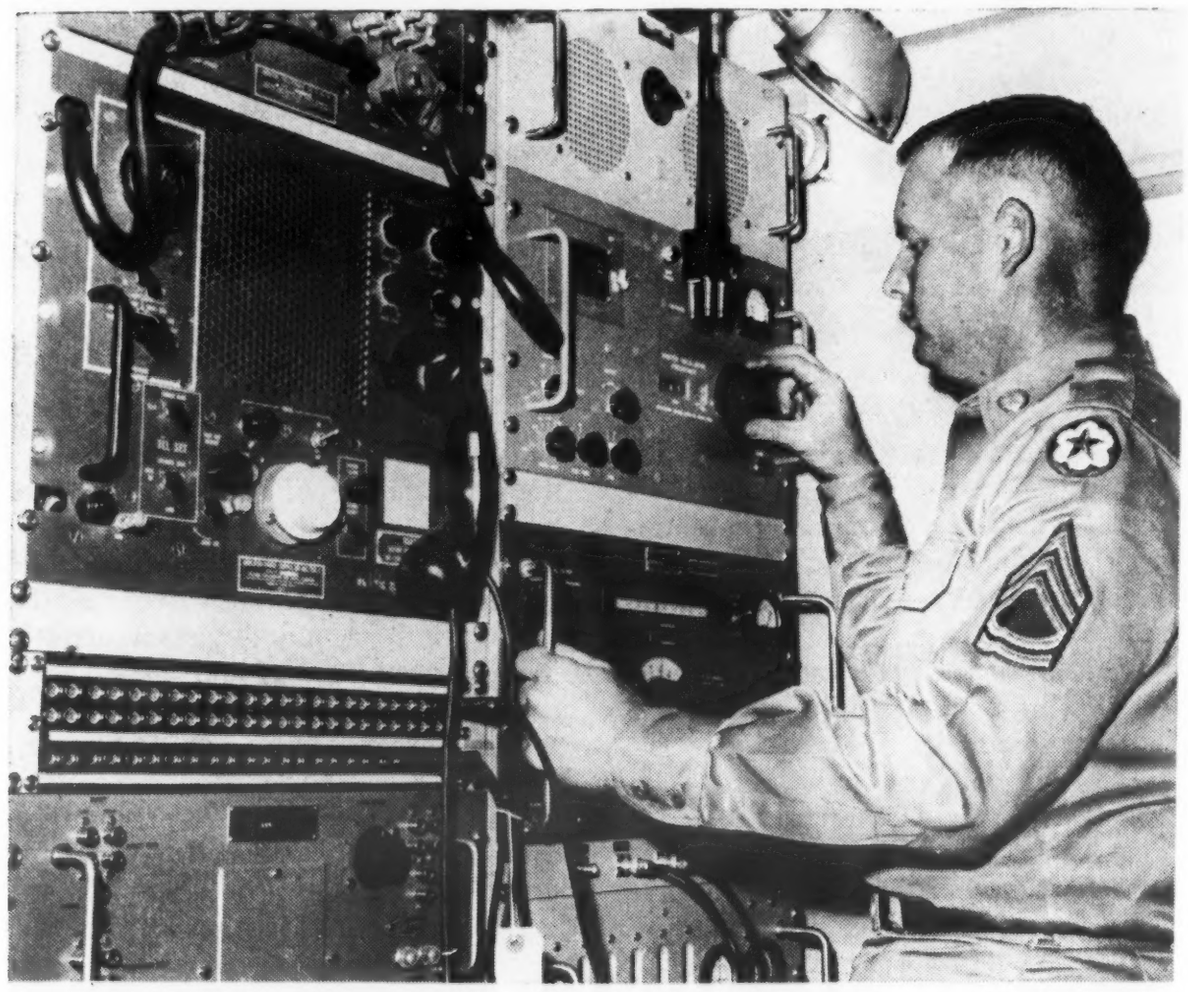
By comparison, the best system available to U. S. Army forces during the Lebanon crisis last year provided no voice channels and only four teletypewriter channels.

The AN/TSC-16 was built for the Army Signal Corps by Adler Electronics, Inc., New Rochelle, New York, based on specifications prepared by the U. S. Army Signal Engineering Agency.

To acquire the new system on an expedited basis, the Army and Industry produced the AN/TSC-16 largely from existing components and equipment. More than 35 equipment manufacturers contributed to the new air-ground transportable communications central. This method of development and fabrication represented a substantial savings in total cost, since it eliminated time-consuming and expensive basic design and development phases.

The AN/TSC-16 is a unique advance in military communications. It is a decided improvement over anything yet designed or developed for long-distance communications for mobile task forces—such as Army STRAC units.

With its tremendous range and multi-circuit capability, the AN/TSC-16 joins the Army's global communications system as an agile and powerful counterpart of large fixed stations and installations, providing a task force commander with immediate and vital voice and teletypewriter communications.



Checking part of the equipment in the air-ground transportable radio communications system (AN/TSC-16).

PART I

AN ENGINEER LOOKS AT ECONOMIC WARFARE

BY MAJ. GEN. E. C. ITSCHNER, USA, CHIEF OF ENGINEERS, U. S. ARMY

THE RISING INTEREST of the American people, particularly business and professional leaders, in the Soviet challenge to economic warfare is a most encouraging sign.

Too few people are aware that the conflict between the East and the West probably will be resolved by economic and political measures rather than by military action. Too many are still ill-informed as to the ability of the Communist nations to develop extremely powerful industrial societies in the years ahead.

Though the United States is highly competent to defend itself in economic warfare, we are at a political and psychological disadvantage at the present time because the public has not been prepared to accept the responsibilities and sacrifices required to meet this aspect of the Soviet challenge. Once our people understand the nature and significance of economic warfare and what we must do to win such a conflict I am confident that we shall do as good a job defending ourselves on that score as we would in the event of military aggression.

In these circumstances, the recent efforts of the National Military-Industrial Conference in Chicago to examine economic warfare and the threat it poses to the United States and the Free World is a hopeful sign. However, if the effort is to be fruitful, it must be both penetrating and sustained. We urgently need non-government leadership in this complex field of internal and international crisis.

Now just what is meant by economic warfare? The answer, I think, is rather obvious to anyone who has closely observed what the Communist leaders are saying and doing. Both their words and their actions demonstrate their belief that a Communistic society will be able to out-produce one based on private enterprise and better provide the fantastically increasing populations of our crowded planet with a great abundance of goods.

We dare not discount the fact that this argument has a powerful appeal to many nations already having difficulty in supporting their teeming populations at a low standard of living.

The Soviets will not be content merely to demonstrate by example. As goods and technologists become more plentiful behind the Iron and the Bamboo Curtains, large quantities of equipment and material—capital, if you please—accompanied by skilled technologists, propagandists and political fifth-columnists will be diverted to the under-developed and discontented countries. After becoming established they will seize control, first of the economy and then of the governments. Should these countries fall, one by one, into the Communist orbit, then it may be only a question of time until the Soviets would be in a position to dominate the rest of the Free World.

Our defense is to keep our own economy expanding with the greatest dynamic force we can muster; stimulate and facilitate the growth of the economies of the other nations of the Free World to the best of our ability, and take strong action to keep them within the economic sphere of the Free World.

My contribution to the exploration of this subject will be to tell you and show you with illustrations what the Sino-Soviet countries are doing to develop their water resources—one of the essential pillars upon which any expanding economy must rest solidly. This is a good indicator of the bold concept with which they are approaching their tasks and it is indicative of their rising technological capability and industrial strength. There is no doubt about it—the Soviets are thinking big and are accomplishing much.

Figure 1 and Figure 2 show the vast geographical sweep of the power and water development programs undertaken by the Sino-Soviet Bloc, stretching from the Danube to the Pacific. The Communists are pouring great investments into these programs, with major emphasis on power and transportation.

Let us look on the map at the geography on which the Soviets are basing their great water resource develop-

ments. First the rivers: the Danube, running from Germany and Austria through the Balkans to the Black Sea; the Vistula in Poland; the Dnieper and the Don in the Ukraine; the Volga in Central Russia; the great Siberian rivers—the Ob, the Yenesey, the Lena, and the Amur; and two huge Chinese rivers, the Yellow and the Yangtze.

There are large industrial areas around Moscow, near the Crimea, around Kuybyshev on the Volga, in the Urals, and in the upper Ob and Yenesey valleys.

The Soviets are making phenomenal gains in hydroelectric development and they are planning to initiate construction of projects soon that will exceed anything we have ever done. For example, Bratsk on the Angara River in Central Siberia—now under construction: This plant when completed will have a 3,600,000 kilowatt capacity. Our largest, Grand Coulee, has 1,944,000 kilowatt capacity. Planned for the future, though possibly some years off, is a plant on the Yenesey which would have a capacity of about 6 million kilowatts. This is greater than the total capacity of all of the power plants at all the dams ever constructed by the U. S. Corps of Engineers. Their inland waterway projects rival ours and their planned developments probably surpass ours, though they have not yet caught up with us in waterborne commerce. The Soviets have larger irrigation projects than ours and they are irrigating new acres probably at least as fast as we are. In other aspects of water resources development, such as flood control, water supply and recreation, they do not have projects equal to ours but appear not to need them at this time. Their engineering and construction appear to be equal to ours. Their power equipment and engineering in items such as generators and transmission lines are excellent and in some respects more advanced than ours.

The most remarkable fact about Soviet water resources development is the rate of growth. Of course, the level from which they started after World War II was very low compared to ours. Most of their progress has been accomplished within the past eleven years; in fact, the bulk of it in the last six years. The Soviets are basing the creation of new economic provinces, including new industrial and agricultural complexes, squarely upon multiple purpose river development plans. They are using water resource development as a means of dispersing industrial and other strategic installations throughout their vast domain, an area 2½ times as large as the United States.

Some of the developments which I will discuss in more detail later are Kuybyshev on the Volga, the largest power plant the Russians now have in operation; Bratsk on the Angara, which when completed will be larger than any of our plants; Krasnoyarsk on the Yenesey, which will be even larger. On the Danube, Rumania and Yugoslavia are planning a large project at the Iron Gate. Near Canton is the Shang-yu Chiang plant, which, though relatively small by United States and by Soviet standards, is the largest yet completed by the Red Chinese.

One of the many Soviet irrigation projects is at Chumysh in Soviet Central Asia.

In the navigation field, the Soviets are developing the Volga-Don River system in a very ambitious project which will connect the Arctic and Baltic Seas in the north with the Caspian and Black Seas in the south. Gorky, on the Volga, is rapidly becoming a modern inland port.

We will look now at the relative positions of the United States and the Sino-Soviet bloc with respect to electric power. (Figure 3, page 9)

Electric power generation is a measure of the development of a country. But we should realize that a much larger proportion of the power production in Russia is used for military production and capital improvement than in the United States. While this chart indicates that the Sino-Soviet block is still far behind the United States in total installed thermal and hydro capacity, their hydro *rate* has just about caught up with ours. It is very likely that their rate of increase will exceed ours within the next five years. Since our stage of development is so much higher than theirs, however, we can expect to continue to add more electrical generating capacity per year than they do for some years to come. Our present hydro capacity is about 30 million kilowatts as against about 11 million for Russia and 15 million kilowatts for the Sino-Soviet bloc, while our thermal capacity is 130 million kilowatts as compared to 42 million kilowatts for Russia and 67 million for the Sino-Soviet Bloc.

Whereas the United States has no completed plants that will reach two million kilowatts capacity name plate rating and only one under construction, the USSR has ten plants ranging from two million kilowatts to six million kilowatts of which one is complete, three are under construction, and six are in the planning or preparatory stages. Five of their Siberian plants will have a combined capacity half again as great as the total hydro capacity of all federal projects in the United States.

The Soviets also have developed a great capability for the construction of thermal electric plants. In order to expedite the over-all installation of power to accelerate their industrialization they have now slowed down their rate of hydro growth and expedited the construction of steam plants, which can be put into service more quickly. However, they have, in no sense, abandoned their enormous hydro programs, for they, as well as we, will need all of the power that can be developed from all sources in the long run.

And now, let us look at some of their giant hydro projects. Figure 4 shows Kuybyshev on the Volga, the largest they now have in operation. Its capacity is 2,100,000 KW, or slightly more than that of Grand Coulee Dam on the Columbia River, our own largest plant.

The Kuybyshev plant houses 20 generators, each rated at 105,000 kilowatts, which compares with the 108,000 kilowatts rating of our largest generators at Grand Coulee Dam. Each generator and turbine is as high as a nine-story building.

Figure 5 shows the giant, six-vane rotor, over 30 feet in diameter, for the turbines. The normal operating head is relatively low, only 63 feet. This generator weighs over 3,000 tons, which compares to 1,200 tons for our largest, at McNary Dam on the Columbia River. The reservoir behind Kuybyshev Dam extends over 300 miles upstream and covers more than 2,100 square miles, an area about the size of Delaware. It contains over 42 million acre feet of water, or about one-third more than the capacity of Lake Mead behind Hoover Dam, our largest reservoir.

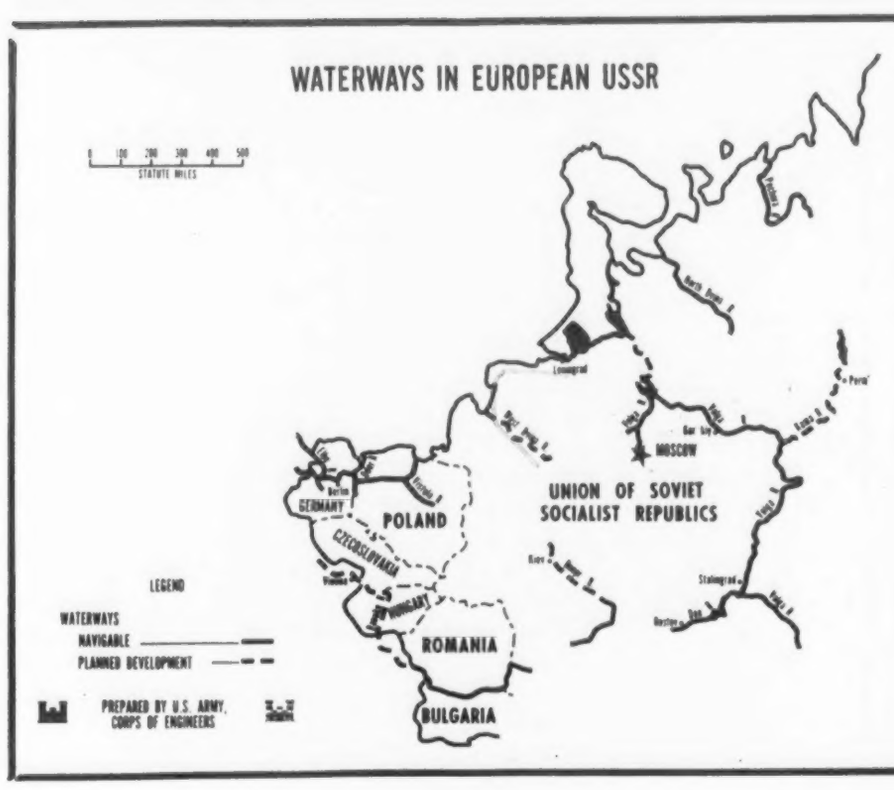
The Russians are installing even larger generators at the giant Stalingrad plant, to be completed in 1961.

The power plants in central Siberia are to be even larger. The one at Bratsk on the Angara river, now under construction, will probably have 18 generators, each 200,000 kilowatts capacity. This 3,600,000 kilowatt plant will have nearly twice the capacity of Grand Coulee.

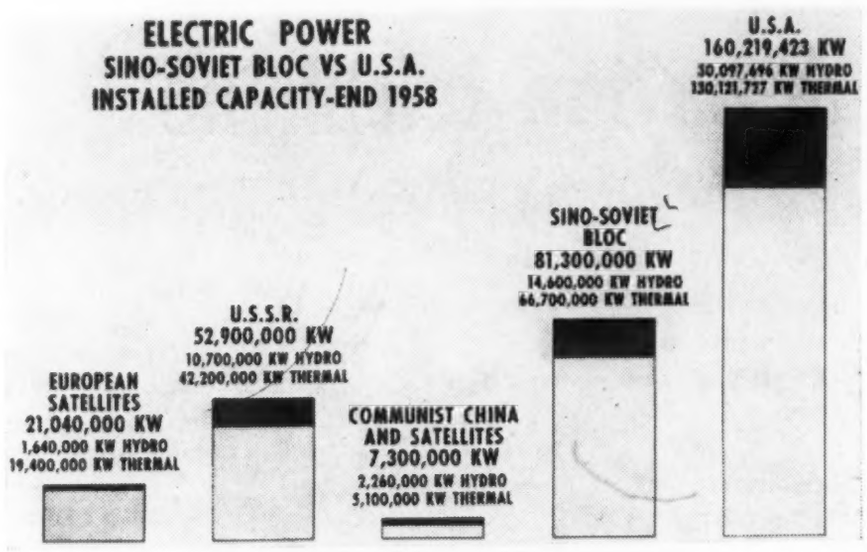
On the Yenesey River, about 360 miles west of Bratsk, another and even more powerful hydro plant has been started near the city of Krasnoyarsk. It will have 14 generators, each with a capacity of 285,000 KW, for a combined capacity of about four million KW.

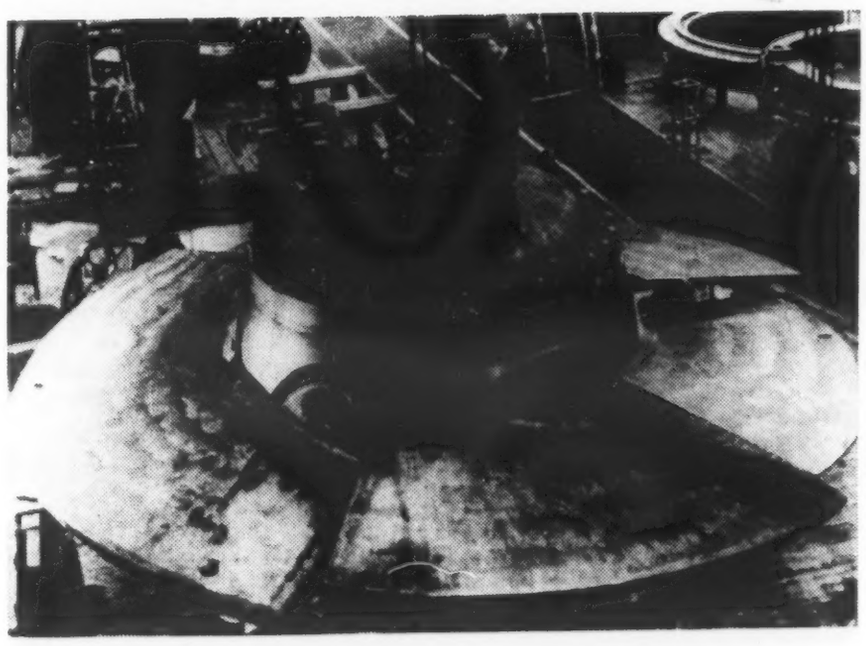
The foregoing figures will give you an idea of the bold concept with which the Soviets have undertaken their

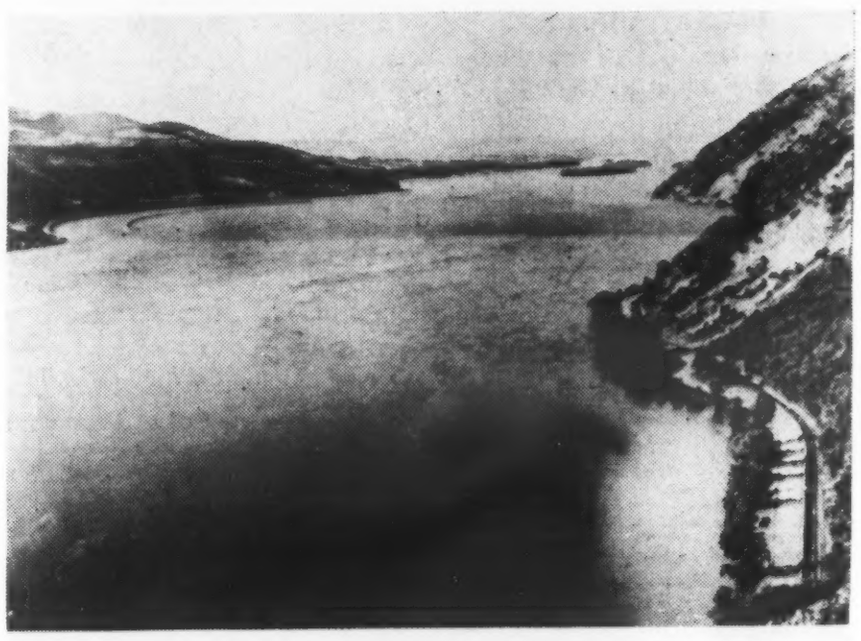
(*Continued on page* 38, *column* 2)

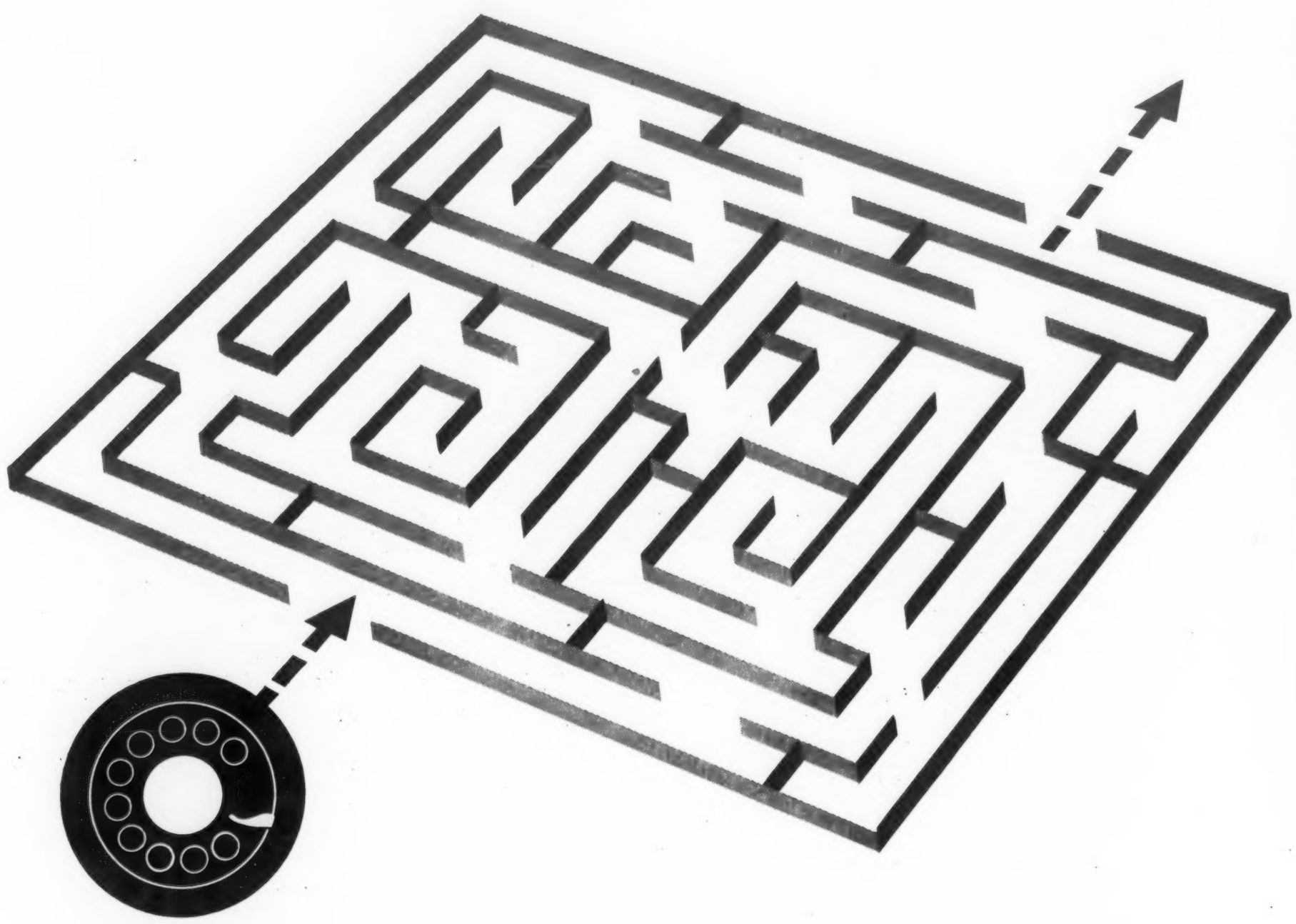


(figure 1—above left) Waterways in European USSR, including navigable and planned development. (figure 2—above right) Water resource development of the Sino-Soviet Bloc. (figure 3—below left) Electric power, Sino-Soviet Bloc vs U.S.A. (figure 4—below right) The 2,100,-000-kw Kuybyshev Hydroelectric Station on the Volga River, showing generator hall and 400-kv power lines. Tailrace is in right foreground; earth dam carries highway in background. (figure 5—bottom left) Turbine runner for Kuybyshev Hydroelectric Station, shown during its manufacture in a Leningrad factory. (figure 6—bottom right) Panoramic view of "Iron Gate" on Danube River, greatest potential hydroelectric plant site in Europe.









Automation cut its teeth on the telephone

...how ITT's early work in telephony aided the advancement of automation

The dial telephone exchange was one of the first examples! Today, automatic switching and new electronic techniques for automation are altering the operations of virtually every business and industry.

It was natural that ITT System companies, pioneers in the first, should be leaders in the second.

Customers have ranged from mail-order houses, railroads, libraries and oil companies to the air forces of several NATO governments.

There have been dramatic results.

One example is the automatic check-processing system developed by ITT System companies for one of the nation's largest banks. It codes, sorts and verifies checks. It performs all normal bookkeeping and accounting operations for demand deposits.

Another is the automation system for a large steel mill which records the program of requirements for every job, then feeds back information to production control centers as each phase is completed.

Still another: the first automatic U.S. post office, now under construction in Providence, Rhode Island.

Hundreds of others could be cited. Each required a complete understanding of automation from the design of a simple switch to the functioning of a fully-integrated electronic complex.

The ITT System has many specialists in this field. Among them: Intelex Systems Incorporated in retained-document automation; Kellogg Switchboard and Supply Company in automatic switching; Airmatic Systems Corporation in automatic-switch pneumatic tube and document conveyor systems; and ITT Federal Division in automatic test equipment, both military and industrial. ITT's European subsidiaries add to this experience.

To learn more about ITT's abilities in the area of automation, write for further information.

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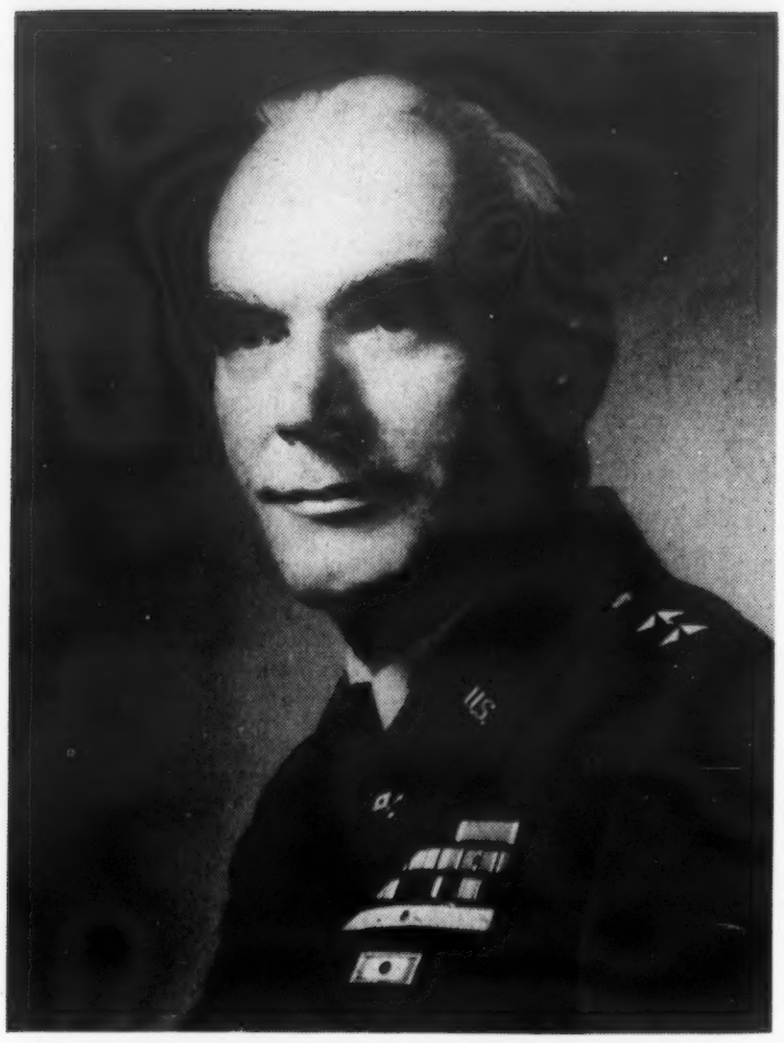


Major General Ralph T. Nelson
Chief Signal Officer, USA

Congratulations

Major General Ralph T. Nelson was born in Lebanon, Indiana, near the turn of the century and attended Purdue University before entering and being graduated from the U. S. Military Academy in 1928—the prelude to a long and successful career in the United States Army. His recent selection and appointment as the U. S. Army's 18th Chief Signal Officer culminates an outstanding military career of over 30 years service.

Following his commission in the Infantry and graduation from the Infantry School, General Nelson served in Hawaii, at Fort Benning, Fort Meade and Camp Wolters. Texas. After a detailed assignment to the Signal Corps in 1942, he was transferred officially to the Corps in 1947. From 1944-1947 he served in Signal positions of great responsibility in the European Theater of Operations with the 15th U. S. Army, the XV Corps, the 9th Infantry Division and U. S. Forces in Austria.

General Nelson has been awarded the Legion of Merit, the Bronze Star Medal, the Purple Heart and the Korean Ulchi with Silver Star. Again, in 1953, he was assigned overseas and served in the Far East Command until 1955, during which period he was Signal Officer of the X Corps and later of the 8th U. S. Army. Until 1958, when he was appointed Deputy Chief Signal Officer, General Nelson served as Chief of Staff and Deputy Post Commander of Fort Monmouth, as Commanding General of the Signal Corps Training Center at Fort Gordon, and as Commanding General, U. S. Army Electronic Proving Ground, Fort Huachuca.

General Nelson has been an active member of the Armed Forces Communications and Electronics Association since 1949, and is an Association Director and National Officer. AFCEA salutes the new Chief Signal Officer, USA, on his well-earned appointment and extends its best wishes and sincere congratulations to a leader in whom we have the utmost confidence.

Happy Anniversary

The entire membership of the Armed Forces Communications and Electronics Association salutes the U. S. Army Signal Corps on the occasion of its 99th Anniversary, observed on 21 June, 1959.

Retiring President's Message

FREDERICK R. FURTH
Rear Admiral, USN (Ret.)
Vice President, ITT Corp.

Our Association has been confronted with several challenging problems during the past two years, problems resulting from national economic conditions as well as those which quite naturally arise during the growth of any active organization. These problems have been faced squarely, resulting in many significant changes designed specifically for administrative flexibilty which should reflect favorably on our Association's future potential. The creation of a Sustaining Membership has opened new avenues for progress. I am sure that many of our present Group Members will welcome the opportunity to transfer to this category, thus supporting our aims and objectives in strengthening the national security.

In many ways our official journal SIGNAL magazine has moved progressively forward both in recognition, substance and reader acceptance. It has given our membership a publication of which we can be justly proud. Our Chapter activities have increased immeasurably, as have the quality and development of our Annual Convention.

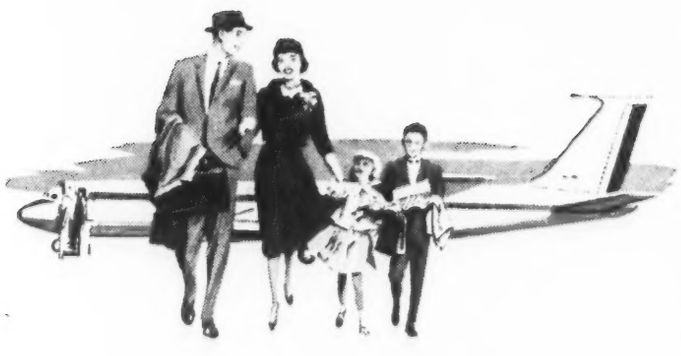
As I relinquish my position as National President, I do so with the full realization that I have been honored to have had the opportunity to serve in this important post. More precisely, it has been a profound privilege to have represented you, the membership. In no way do I minimize the outstanding cooperation and prodigious support given me by all hands in the fulfillment of my responsibilities.

It is my personal conviction that AFCEA has turned the corner. It has outgrown its pre-launching trials and tribulations and should now be on a course of steady advancement.

I extend to one and all my deepest gratitude and sincere thanks.

Raytheon Flight-Tracker radar, showing air routes near Indianapolis. Straight lines show routes, X's are check points, concentric circles indicate range in miles. "Pips" are aircraft.

New Raytheon radar helps safeguard your flight

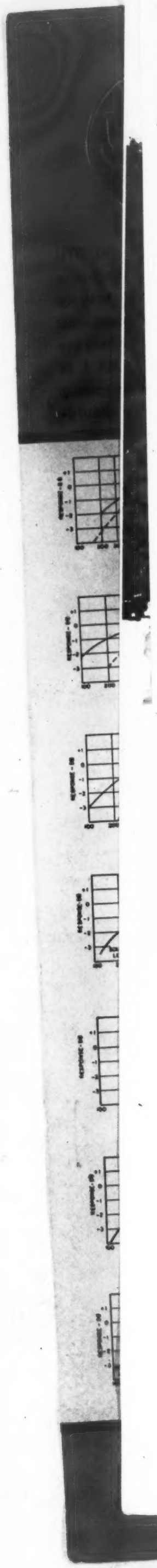


Commercial, private and military flights total 69,000 a day in the U.S.! Control of this traffic, the task of the Federal Aviation Agency, is now aided by Raytheon Flight-Tracker radars. Each of these powerful units can pinpoint aircraft up to 200 miles away in all weather—even in storms.

Raytheon has delivered 26 radars for a system to span the continent—to be fully operational by Fall, 1959. The control network will eventually blanket the entire country with 70 radars. Plans also call for the incorporation of a unique microwave tube, the Raytheon *Amplitron,* in the Flight-Trackers to increase their range and tracking efficiency.

By helping the F.A.A. to control airways traffic, speed schedules and reduce "stacking," Raytheon brings nearer the solution of a major transportation problem.

Excellence in Electronics RAYTHEON **RAYTHEON MANUFACTURING COMPANY, Waltham, Mass.**



THE SERVICEMAN and printed circuits

by D. H. KUNSMAN
President, RCA Service Company, Inc.

RCA'S STAND on the matter of printed circuitry versus hand-wired circuitry was not taken without years of experience in engineering and producing printed circuits. Such circuits were built into proximity fuses as early as 1943 by RCA involving the experience of handling thousands of television sets into which these boards were incorporated. I believe it is a safe assumption that no one in the television industry has more experience and knowledge of printed circuitry from the development, production and service standpoints than RCA.

There should be little or no need to sell printed circuitry. That is not the problem. There is, however, a problem—one that has at least two sides.

1. The term "Printed Circuit" has become associated with "cheapness" in the minds of the public. And there are those who are attempting to sell it to the service industry.

2. Television engineers of the various producing companies have given too little thought to the service technician in their design of chassis.

The cause of printed circuitry was hurt inadvertently by a television manufacturer, no longer in business, who spent thousands of dollars in television commercials in which built-in antennas, presumably printed on paper, were torn up before the public's eyes. The purpose of this commercial was to sell what is referred to as a rabbit-ear antenna that telescoped into the set itself—but the approach was a comparison with something that was cheap—and printed.

The second part of the problem involves the service industry. Nearly all technicians learned television service by soldering wires—not by handling boards on which circuits had already been etched. The trade schools today are still featuring the hand-wiring techniques.

The problem of tracing circuits, isolating faulty parts and their removal has, until recently, received too little attention from the manufacturers. Boards are soldered to chassis and because of required shielding, the boards must be unsoldered in some cases to permit work on the under side. To the inexperienced, this is a time-consuming operation and can be frustrating. And let me assure you, the independent service technician or servicing dealer is not bashful about his complaints against manufacturers.

The answer to the first part of the problem rests in a name. Many manufacturers of television sets, including RCA, have adopted names to offset the stigma inherent in the term 'Printed Circuitry." From the RCA viewpoint, we use the term "security sealed circuitry." The public must be sold around the images of torn, built-in antennas and broken circuit boards which it has seen on television. I believe that a change in name, together with an introduction of history on service reliability, will be a giant step forward.

The answer to the second part of this problem is not difficult, but it takes a little more doing. Engineers designing chassis must become more aware of the field servicing problems. I'd like to exemplify what we have accomplished at RCA through having our service people, who are well acquainted with service industry problems, work closely with the design engineers.

In scrutinizing one of the security sealed circuit boards from the new portables recently introduced, it was noted that the circuit is shown on both sides of the board—having been put on the component side with white ink. On the component side also are shown component locations. In addition, we have found that shielding could be greatly reduced, thus opening up and making more accessible the under side of the board.

We call the upper part of the board the "roadmap." Anyone who can read a simple roadmap will have no trouble in locating tubes, components or tracing the circuits since all the technician guides are printed clearly on the top side of the board.

Granting that the technician had some legitimate complaints about spending more time than he wanted to spend in tracing circuit troubles (please note—I did not say more time than on hand-wired chassis) I am sure that this new "roadmap" idea will reduce his time considerably. This important development, which incidentally is impossible to achieve with hand-wired chassis, will make television servicing far easier than any previous type of chassis—either hand-wired or printed circuit.

Present plans call for the use of the "roadmap" type of security sealed circuits in future RCA Victor television receivers wherever possible.

In the new portables, 98% of the service requirements can be handled by merely removing the back of the set and without removing the chassis. The location of the security sealed circuitry boards, as well as a redesign of the entire chassis, makes servicing the easiest of any set we have produced to date.

In a talk which I made recently to the National Appliance and Radio Dealers Association (NARDA) at their national convention in Chicago, I had the opportunity to discuss printed circuitry and the reliability of these circuits.

I said, "In a study we made on 5,000 service calls on sets employing

printed circuit boards, we found that less than 2% of those calls had anything to do with the boards themselves. That's right—less than one call in 50. For the average serviceman, this means he would encounter trouble in the board about once every two weeks if he worked only on sets that employed printed boards.

"Here are some additional facts on the printed circuit board situation at the RCA Service Company. We have in our television branch stocks, 78 different stock numbers of printed boards. During the six months ended October 31, 1958, the RCA Service Company, in its branches throughout the country, replaced exactly 2 printed boards on every 10,000 service calls.

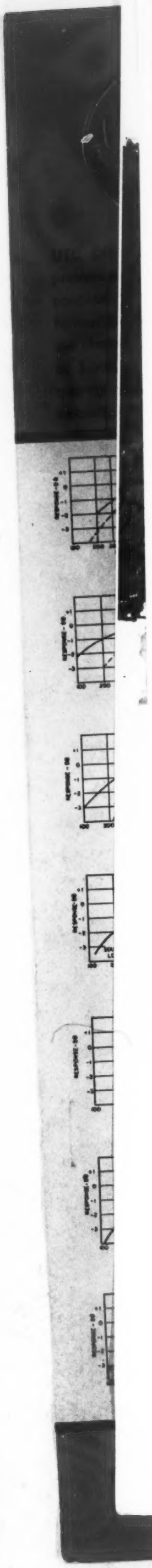
"Now let's look at that statistic another way. An unusually good technician can handle 40 calls per week, 50 weeks per year, or about 2,000 calls per year. That means that the best of technicians, working on RCA Victor sets exclusively, would replace a board on the average of once every 2½ years."

Shortly after making this talk, I received a letter from an independent serviceman who said, "Just finished reading your speech. Many servicemen do not resent the printed circuit board itself, but the inaccessibility of working on sets that use them."

I believe our recent moves have helped to solve his problem.

Over the years we have received many amazing stories about the performance of our television and other consumer products which use printed circuit boards. One of these which came to my attention some months ago convinced me that printed boards are rugged and the only answer to top performance.

On June 4, 1958, a tornado hit the town of Colfax, Wisconsin. The home of Mr. and Mrs. Joseph Schwartz was demolished. Their new RCA Victor television set was picked up by the wind and dropped in the mud 175 feet away. It lay there exposed to the weather for eight days, during which time it rained off and on. After eight days they found their TV set and took it to the Hoyland Electronic Company in Colfax for repair. Yes, you guessed it—it worked perfectly. While this performance cannot be attributed entirely to the existence of printed boards, our service people pointed out that had the set contained a hand wired chassis, the receiver would not have worked without a great amount of repair.



by

THE AMATEUR AND THE MILITARY AFFILIATE RADIO SYSTEM

Lt. Gen. James D. O'Connell,
USA, (Ret.)
Former Chief Signal Officer

THE YEAR BY YEAR increase in the number of amateur operators and stations shows that amateur radio activities are rapidly taking their place as one of the country's leading and most popular hobbies.

Although amateur operations are carried on as a hobby, the result is the creation of a large reservoir of personnel skilled in the art of radio communication. This has proved of value both to the nation in time of war and to industry in time of peace. All of us recognize the radio amateur's unique ability to enhance international good will.

I have for several decades appreciated the potential worth and ever-increasing value of radio 'hams', both young and old, available to our country's requirements.

The definition of the word amateur, according to Webster, is, "one who follows a pursuit without proficiency or professional purpose. The practicing of an art without mastery of its essentials." I'm not convinced that this definition describes the radio amateur adequately —in view of the technical prerequisites and professional-like accomplishments.

From a humble beginning at the turn of the century, amateur radio has grown to become an established institution. Today, the American followers of amateur radio number over 170,000 licensed trained communicators. From these ranks will emerge professional communications specialists, research and development personnel and the electronics executives of tomorrow just as many of today's leaders of the communications industry were first attracted through an intense curiosity and feverish pursuit of what they called wireless telegraphy.

Today, hundreds of grade school and thousands of high school students have strived for and attained the cherished 'ham ticket'. A great great number of mature and elder persons have become intrigued with this scientific hobby. The interests of these individuals have been guided to advanced training. Many have become leaders in electronics in defense and industry.

It is not particularly simple to become a licensed radio amateur. One must first possess the desire to communicate with others— or want to construct, test and operate a rig on the air. To do this, one must comply with regulatory requirements of our Government. The international Morse code must be learned at a qualifying speed by our potential radio amateur. He must familiarize himself with radio theory. He must know about the transmission and reception of electro-magnetic waves, communications procedure, regulations governing the amateur service, and general safety practices.

Here our potential 'ham', for the most part, becomes self-trained. He seeks the essentials of radio to pursue his right to a place among brother amateurs. He is examined by the Federal Communications Commission or their representatives —and upon passing—is issued a federal license. This graduation most often leads to new and further experimentation with modes of transmission, power and improved techniques of communications generally. Here now, collectively, lies a foundation for his advancement in the communications-electronics arts and sciences.

I have reiterated a bit of the pattern of pursuit so well known to amateurs individually, primarily for the benefit of others who may have viewed our 'ham' in the light of the strict literal definition of the word amateur.

At the beginning of World War II, the Army Signal Corps, as other services, had a tremendous job of securing and training specialists from basically qualified personnel for immediate mobilization. Thousands of basically qualified radio amateur operators were subsequently assigned—either to the Army Signal Corps, or to combat arms as communications personnel. They were given further specialist training, leading to rapid assignment into key positions in preparation for the offensive build-up. The availability of the self-trained radio amateur made possible an early fulfilment of immediate requirements for skilled Signal Corps personnel.

Radio amateurs, in time of mobilization and war, normally pursue assignments in military communications and electronics. On the other hand, many hundreds of military personnel who became trained in communications-electronics in the services have joined and formed a substantial part of the greatly increased number of present day amateurs.

At the outbreak of the war, early in 1942, the Army Signal Corps could not meet the demands to supply immediately radio communica-

tions equipment. Although industry had tooled-up and military contracts had been placed, the requirement for radio equipment far exceeded the available supply. Manufacturers had to have time to produce standard militarized equipments. It was during this period that several million dollars were allocated to purchase amateur radio equipment available on the shelves of local suppliers—as well as purchases of amateur gear direct from individual 'hams'. This equipment—available due to the amateur activity—was used at army installations for as long as 1½ years after purchase. Here is an example of not only the self-trained amateur going to war but in some instances his entire amateur radio station.

One of the most important developments in the amateur service today is the ever increasing willingness of amateurs to devote themselves and their equipment to civil or military emergency type communication services.

Along these lines, many hundreds of naval reservists, who are radio amateurs and maintain their own personal equipment at their homes, are actively engaged in the Naval Reserve Operational Communications Network for training and volunteer emergency service.

The Army and the Air Force jointly conduct an auxiliary communications program known as the Military Affiliate Radio System. The foundation of this system is the approximately 10,000 licensed radio amateurs throughout the nation and certain oversea locations. Today's program contrasts greatly with the beginning of joint military and amateur activities.

In early 1925, at Camp Alfred Vail, now Fort Monmouth, New Jersey, the idea of an affiliation between the Signal Corps and the Radio Amateur was discussed. Major George L. Van Deusen, now Major General retired, the Commandant of The Signal Corps School, directed Captain Tom Rives, now Brigadier General, USAF, retired, who was in charge of the Radio Section, Enlisted Department of the Signal School, to develop a staff study on the subject. The study recommended the establishment of an Army Amateur Radio System.

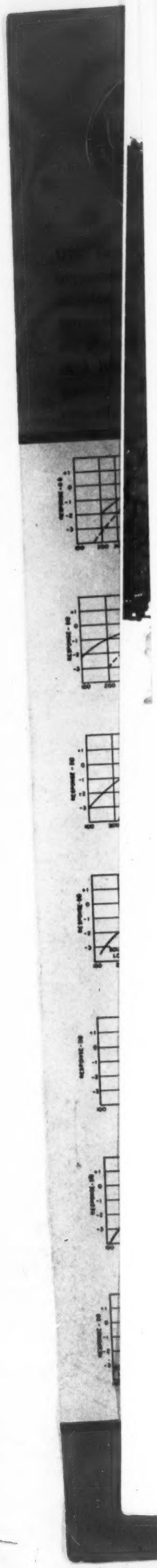
This system was approved by the Chief Signal Officer and in August 1925, Captain Rives met with the late Hiram Percy Maxim, Jr., then President of the American Radio Relay League and Ed Handy, a former colonel in the Signal Corps. In October 1925, *QST* published the agreement between the Army Chief Signal Officer and the ARRL in establishing the new AARS.

In November 1948, the AARS was redesignated as the Military Amateur Radio System and in September 1952 was renamed the Military Affiliate Radio System.

The present day MARS program provides an existing potential of trained personnel in military type communications. They have learned military procedures and traffic handling. They have a capability to handle traffic in emergencies and can extend regular military communication systems when required.

Volunteer amateurs operating MARS stations have participated in numerous Army communications exercises. The success of these proved that the value of MARS is of such magnitude that it must be considered as one of the Army's important communications assets. The Army Signal Corps will continue to support MARS.

In addition to the military applications, I can think of no other hobby that contributes so much to technical advancements, to the welfare of others, and to world brotherhood. Amateur Radio — truly — exists for the service it renders.



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RELIABILITY THROUGH ADEQUATE SPECIFICATION

by **AUGUST R. PARK**
Electronics Division
Westinghouse Electric Corp., Baltimore, Md.

THE ELECTRONICS industry has been faced with the necessity of establishing a formal and effective reliability program. The Armed Services have made their intentions clear in that they want equipment for the future that will perform its function well with a minimum of maintenance and repair.

In recent reports, the Armed Services state that anywhere from two to ten times the original cost of an equipment for maintenance alone is required, and it is not hard to visualize how much more new equipment could be purchased if a minimized maintenance problem could be accomplished. In addition to new equipment, it is hardly necessary to mention the importance of reliable equipment to our national security.

Although the end results required are clear, the many problems of achievement which face the electronics industry are complex and require careful analysis.

Qualitative Reliability

When one looks at the scurrying around that has recently been apparent in industry in connection with reliability, the question cannot help but arise—"What have we been producing during the past years that has gotten us through so well?"

To answer this we must consider the definition of "reliable." There are two sides to the definition of reliability. The words *dependable* and *trustworthy* are subjective terms and are certainly not amenable to quantitative measurement.

The qualitative connotation of reliability is important and should be kept in mind, but like other terms used in science and engineering, the word reliability must be assigned an exact, specific, and—above all—*measurable* meaning, if it is to be useful in a technical sense.

This is where one difference exists between the requirements of the present and those of the past. In the past, an equipment could be satisfactory with a reasonable dependability and maintenance. If a radar missed a few pulses when tracking a ship doing 15 knots or a plane doing 200 miles an hour, it was still adequate in most cases. Today, however, with supersonic planes and missiles, if a radar using automatic computer devices misses a single pulse, the mission may be lost. We must know an equipment's reliability accurately.

Quantitative Reliability

The essential concept in a technical definition of reliability is *probability of success.* The most accepted definition in use today is the Electronic Industries Association's definition: "Reliability is the *probability* of a *device performing* its purpose *adequately* for the *period of time* intended under the *operating* conditions encountered."[1]

The definition makes success synonymous with adequate performance and it states as indicated by the underlined words, the factors and conditions which must be specified before reliability can be measured.

Industry-Wide Program

We can now see the need for a formal reliability program accurately defining the reliability parameters. Informal programs can be effective; however, they tend towards different directions, or result in costly duplication of effort while never really arriving at a single definite result.

Almost everyone associated with complex equipment feels that he has a full understanding of reliability. More often than not, however, this understanding consists of little more than conflicting generalities. For example, one theory is that we can increase reliability by reducing the number of parts, while another theory calls for doubling the number of parts. Still another theory claims the best preventive maintenance is no maintenance at all, while the contradictory view maintains that constant attention will keep any equipment going forever.

It is always possible to generalize reliability, but to really understand it we must be able to describe, predict and control the behavior of equipment accurately. This can only be effectively accomplished through a formal and uniform industry-wide program which clearly specifies the parameters of reliability.

Specification Criterion

It may be said that what we need is uniformly specified reliability parameters. This in itself is a complex problem. A specification is a detailed description of a material, product or service, setting forth the technical requirements such as dimensions, materials and performance for the item required. The specification must also include the program by which it may be determined that the requirements have been met.

A specification must be the link between the designer, producer, inspector, shipper, purchaser and user of equipment. It must be written in a common language understood by all parties, and it must be explicit and definite in its statement of the characteristics of the item being specified. As indicated by B. A. Diebold in his article "Specification Engineering—for Military Components and Materials," the necessary features for an adequate specification include title, scope, application, objective, test procedure, requirements, adequate inspection and packaging details, qualification approval details, geometric configuration, dimensions,

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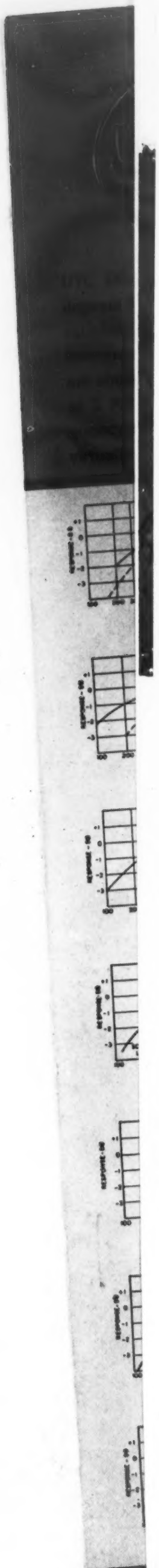

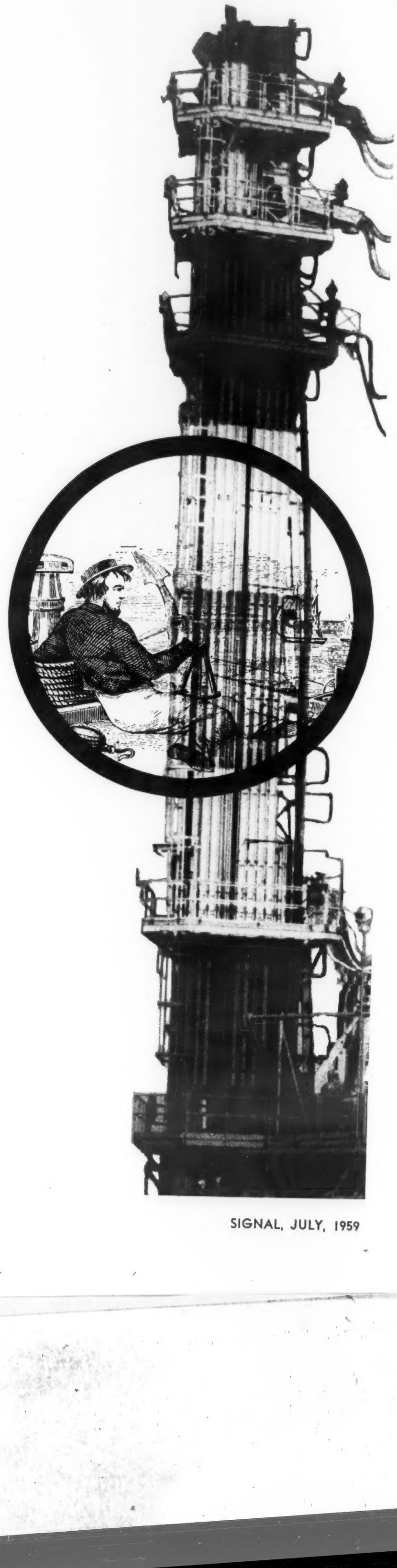

PORT OF EMBARKATION

In the decade of missilery ahead, prime contractor capability must go far beyond the requirements of hardware design and manufacture. New experience and facilities are now required in the increasingly critical launching phase—from ground handling and testing to countdown and data control.

Martin's Cocoa Division is the first organization of its kind devoted exclusively to this specialized area. Accomplishments have already established new operational standards at Cape Canaveral, one of the two U.S. ports of embarkation for the major space events of the decade ahead.

An example of the latest development in electronic fail-safe launching equipment is the new Martin Master Operations Control [MOC] system, which automatically monitors count-down procedures in the test firing of research and development-type TITAN missiles. With equipment such as this, TITAN launchings have achieved unheard-of performance reliability.

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values, characteristics, ratings, tolerances, plus any other information pertinent to the specified item. The specification must provide for increased reliability under conditions of decrease in size and weight, simplification of manufacturing techniques, and conservation of critical materials often involved in cost reductions and value engineering.[2]

It is impractical to give an exact check list of all of the variables that should be specified in military electronics. However, there are some questions that should always be asked when taking the engineering approach to a specification. If an equipment requires a certain item, the basic questions that must be asked in preparing the specification are: What is the unit for? What must it do? What must it not do? What requirements must it therefore meet? What are the differences between one available unit and another? Which of these are of importance in this case? How can this information be conveyed to interested parties?

Military Responsibility

It must be recognized that the answers to design problems can be both quantitative and qualitative, and both are necessary for adequate specification. In the past, performance requirements such as voltage, current, frequency, etc., have been stated in quantitative terms and the contractors have been specifically held to them. To the contrary, the level of reliability of a system has been qualitatively specified and treated with no specific obligation.

The Department of Defense has recognized the fallacy of this approach. As indicated in the Advisory Group on Reliability of Electronic Equipment (AGREE) Report (June 1957), reliability cannot be treated as a vague afterthought.[3] In other words, it has been the practice in the past to consider reliability after the design has attained the rigidly specified performance requirements. It is too late to worry about reliability after the design is complete, because the design creates an irreducible failure rate which cannot be debugged from the completed equipment.

Task Group 1 of AGREE reports that, "Reliability requirements should originate with the groups responsible for the operational requirements and military characteristics of the various Services, since it is through these groups that the Services must deter-

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Crosley

And . . . . . .

Fire Control Systems for the B-52

New and greater responsibilities have been given Avco's Crosley Division by the U. S. Air Force. Long a producer of fire control systems for bombers, including the B-47 and B-66, Crosley recently was named prime contractor for the ASG-15 fire control system on B-52 bombers ordered for the Strategic Air Command.

Crosley now has complete responsibility for engineering, production and performance. Two of Crosley's large plants manufacture, assemble and test complete turrets, computers and radar units for the ASG-15 system that both "searches" and "tracks" to aim the guns that defend the B-52.

In the months and years immediately ahead, many new and ingenious improvements will be made in bomber defense. Crosley already is at work on several, and has achieved remarkable results that will be reflected in the bomber defense systems of the future.

Crosley's extensive experience and technical capability have made it the first name in fire control systems.

For further information, write to:
Vice-President, Marketing-Defense Products,
Crosley Division, Avco Corporation,
1329 Arlington Street, Cincinnati 25, Ohio.

OPPORTUNITIES FOR ENGINEERS

Crosley offers excellent opportunities to mechanical engineers with experience in airborne gunnery, and electronic engineers with experience in fire control, radar and servos. Write to: Director, Scientific and Technical Personnel, Dept. S-79E, Avco/Crosley, 1329 Arlington Street, Cincinnati 25, Ohio.

Avco/Crosley

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mine how they intend to accomplish their mission. In turn, these figures should be translated into contracts for the new developments."

AGREE Task Group 4 stated, "The procuring agency must specify the required reliability. The specification is meaningless unless the requirements are stated in quantitative terms."

All of this can be summarized in a few words. The Armed Services must uniformly and specifically state their reliability requirements in definite quantitative terms and with full contractural obligations included. *To Get Reliability—Specify Reliability!*

Military Reliability Specifications

In addition to the AGREE Report, further indications that the Armed Services are recognizing their responsibilities in specifying reliability are the general reliability specifications that have been issued.

NAVY MIL-R-19610 (AER) September 1956, is the Navy Bureau of Aeronautics, "General Specification for Reliability of Production Electronic Equipment." This specification outlines the minimum requirements which the contractor must perform on production equipment to assure the production of reliable equipment. Levels of reliability are defined in terms of operating hours without failures. Minimum test requirements for electronic parts are given and a quality assurance provision for complete equipments is specified.

AIR FORCE MIL-R-25717B (USAF) November 1957, is the Air Force specification, "Reliability Assurance Program for Electronic Equipment." This specification covers the general requirements for the reliability assurance program and establishes the minimum supporting areas to be considered by the contractor to assure the adequacy of his program to achieve the quantitative reliability specified in the detail specification for a particular equipment. The specification notes that, "This specification is used to assure a definite approach to an adequate reliability program in the production of electronic equipment. To be adequate, however, the *detail specification must establish specific quantitative minimum requirements for reliability, such as mean-time-between-failures for an adequate test group of equipments.*"

In addition to these specifications, the Air Force has further emphasized reliability by putting special requirements in its MIL-E-4158B (USAF), January 1958, "General Requirements for Electronic Ground Equipment." The specification, in addition to defining reliability and what constitutes a failure, calls for the contractor to supply the procuring activity with a quantitative prediction of the reliability of operation of the equipment in terms of mean-time-between-failures. A reliability testing program for the demonstration of reliability is also included.

Reliability Specification in Contracts

The general specifications are mainly concerned with programs. The individual contracts must specify the details of the quantitative reliability required for a specific equipment. There are several important aspects in this area that must be understood to insure adequate specification.

The factor of reliability is inevitably connected with statistics. In specifying reliability as a *probability* of success we must consider certain statistical rules. Cramer, in his "Mathematical Methods of Statistics," points out that, "The chief object of statistical theory is to investigate the possibility of drawing valid inferences from statistical data, and to work out methods by which such inferences may be obtained."[4] In the mathematical theory, we use a definite number R which is called the probability of an event E with respect to the random experiment T. The concrete meaning of P is that in a long series of experiments, it is practically certain that the frequency of the event E will be approximately equal to P. This can be stated more precisely by the frequency interpretation of the Bernoulli Theorem, but this is not necessary for our present consideration.

There are two important points to note in the theory of probability which are relevant to adequate specifications. The first point is that the whole theory depends on "Random Experiment T." In specifying reliability it is necessary to allow for sufficient testing to give statistical validity to the requirement. A full treatment of recommended reliability test procedures is found in the report of Task Group 3 of the AGREE Committee.

As indicated in the definition of a specification, the reliability specification must include the method for determining compliance with the requirements. This means a concrete requirement for demonstration of reliability, as indicated in a release from the Office of the Director of Guided Missiles, Office of the Secretary of Defense, April 1958, "Proposed Reliability Monitoring Program," must be stipulated. It is stated that, "In the application of a reliability monitoring program, increased funding will often be required to attain acceptable confidence levels in the demonstration testing phases."[5] Although this increased testing program raises the initial cost on a contract, an over-all savings will be recognized by such a program.

The second point in the theory of probability, which is relevent to adequate specification, is that the, "Frequency of the event E will be *approximately* equal to P."

The statistical theory hinges on some level of confidence that what is predicted will come true. We never get a sure thing. Thus, when specifying reliability, the specification must recognize the confidence level, and specify a reliability sufficient to meet the need, but realistic in allowing for a statistically valid evaluation.

It should be noted that we are using confidence level as a synonym for the probability that we have a correct evaluation of the "universe" based on a limited sample.

Equipment Type Determines Nomenclature

Another important aspect in specifying reliability is the recognition of the difference between types of equipment. By definition, time is an essential element in any evaluation of reliability. We are interested in satisfactory operation of the equipment. The nature of the design and usage of the equipment determines the method Westinghouse uses for specifying reliability. For a weapon type equipment, such as a torpedo or missile, operating time, i.e., mean-time-between-failure, is not a primary consideration. This is true because the wear-out time of most parts or assemblies will greatly exceed requirements, and failures of a random nature are most important. The reliability is specified in terms of the probability of a successful mission. That is, when we say a missile is 95 percent reliable, we mean that the probability of a failure of the missile to make a successful hit, attributable to missile malfunction or component failure, shall be less than 5 percent.

In the case of nonexpendable equipment, such as radar or communications systems, operating time is of prime importance. The equipment is not a "one shot" type unit, but a repairable system. The amount of time the equipment can

be satisfactorily operated is of prime importance, so we specify reliability in terms of the average or "mean-time-between-failures." This agrees with MIL-E-4158B (USAF).

Component Compatible with Equipment

All of the above discussion has been devoted to programs and equipment. A very important aspect of "Reliability through Adequate Specification" is the proper component specification. It must be recognized by both the armed services and industry that equipment specifications and component specifications *must* be compatible. Too often an equipment will have special requirements but the regular component specifications are used with the result that equipment reliability is reduced. It is the responsibility of the contractor to make his suppliers aware of the actual reliability requirements of an equipment. Too often, parts that qualify in the laboratory fail in the field.

To quote a part of the Air Force reliability specification, MIL-R-2571-7B: "It should not be presumed that because a part of material is Joint Army-Navy (JAN), Military (MIL), or STANDARD, that it will automatically possess the required degree of reliability." It is mandatory, for adequate specifications, to provide the component manufacturer with actual equipment application information, so that he can help determine where the basic component MIL Specification is adequate, or where and how much of a safety factor or deviation from the specification is required for reliable performance.

Qualified Products List

An important point to be stressed in component procurement is the role of the qualified products list (QPL). Quite often a contractor buys all his components from QPL suppliers and considers his worries to be over. However, it is not adequate to specify a QPL product without provision for evaluation of the component to demonstrate current compliance with specifications.

The QPL, by definition, is a list of products which qualify under the requirements and tests stated in the MIL or JAN specification applicable to the particular product.

The purpose of the QPL is to guide the Military Services, together with their contractors, in the design and procurement of equipment for military applications.

It is important to understand that the QPL is only a guide and *indicates a capability, rather than a guarantee,* on the part of the manufacturer to supply qualified products.

Experience at Westinghouse, as is true throughout the industry, indicates that in a new product or "first time" procurement, a high level of inspection and component evaluation must be included to make the specification adequate to guarantee reliability.

Reliability Control

Fundamental to adequate specification is the recognition that the purpose of reliability specification is reliability control. This point is succinctly treated by R. R. Landers in his article, "Reliability—The Factors of Failure." One of his arguments is as follows:

Control as defined by Webster is: "To exercise directing, guiding or restraining power; *To Keep Within Limits.*" Reliability control does *not mean to keep improving.* Where a subcontractor is called on to supply a sub-system or unit, he is given certain test limits. However, he cannot be allowed to use the "weakest-link-in-the-chain" technique in meeting these limits.[6]

In other words when the subcontractor performs his testing and a part fails, it is not sufficient to strengthen the failed part and proceed with the test. This technique will not improve the reliability of the system or unit as a whole, since strengthening one component could very easily result in weakening another with much more serious overall results.

For a concrete example, consider the man leveling his desk. If he uses the weakest-link method, he will probably keep adding to the shortest leg. This could result in a desk indefinitely high. The proper technique to level the desk is to measure each leg and compare it with the standard or desired height of the desk. Then by adding to some legs and shortening others, the desk is leveled to the required height.

This example shows exactly the technique required for adequate specification for reliability. Reliability control must have a standard "height"; a level which must be clearly specified so that the equipment and components can be properly adjusted to this standard and equipment reliability both accurately predicted and realistically achieved.

Reliability can neither be tested nor "legislated" into an equipment—it must be built in. In order to attain the desired level of reliability, we must realistically specify the reliability desired and also the method by which we intend to verify or measure the achievement of this reliability. It is important to recognize reliability as a relative thing. It should be realized that there is no absolute reliability in time. However, through proper design and the proper selection and use of components—adequately procured—industry can produce electronic equipment of a high degree of reliability. The major responsibility lies with the Armed Services in specifically requiring a definite equipment performance. They must incorporate in their contracts exact requirements for the reliability of the equipment including definite contractual obligations on the part of their contractors to demonstrate the attainment of this reliability. This program will, of course, require appropriate funding but when the vast expense of the military maintenance program, and the immeasurable importance of reliable equipment to national security is considered, the cost of an adequate reliability program will be a small part in the military budget. Reliability has been studied and discussed for many years, but until both the Armed Services and industry actively and realistically pursue a reliability effort, nothing will be accomplished but a monument to the state of the art of symposium proceedings. The only way to an actual advance in the reliability of military equipment is through *adequate specification for reliability.*

1. C. R. Knight, E. R. Jervis, and G. R. Herd, "The Definition of Terms of Interest in the Study of Reliability," *IRE Transactions on Reliability and Quality Control,* PGRQC-5, April 1955. pp. 34-40.
2. B. A. Diebold, "Specification Engineering—for Military Components and Materials," *Electrical Manufacturing,* December 1953.
3. Advisory Group on Reliability of Electronic Equipment. Office of the Assistant Secretary of Defense (Research and Engineering), "Reliability of Military Electronic Equipment," June 4. 1957.
4. H. Cramer, "Mathematical Methods of Statistics," Princeton University Press, 1954.
5. Office of the Director of Guided Missiles, Office of the Secretary of Defense, "Proposed Reliability Monitoring Program," April 1958.
6. R. R. Landers, "Reliability—The Factors of Failure," *Research and Engineering,* April 1957.

— GOVERNMENT —

UNITED STATES NAVAL WEAPONS PLANT is the name of the Naval Gun Factory in Washington, D. C., effective July 1. The gun factory, which was established in 1799 as the Washington Navy Yard, no longer manufactures new guns, but is primarily engaged in work in the field of guided missiles, electronics and other modern weapons. The 125-acre center has 5,800 employees and does about $50 million worth of work every year.

30 DAYS' NOTIFICATION OF PROPOSED PRICE INCREASES by companies in basic industries is one of the main points of a bill aimed at curbing inflation which is presently being discussed by the Senate Subcommittee on Antitrust and Monopoly. Designated S. 215, the bill also requires the companies to justify the price increase at a public hearing.

ELEVEN ROCKET SHOTS TO THE MOON AND INTO SPACE are planned by the U. S. during the next two and a half years, according to a National Aeronautics and Space Administration report. The lunar and space probes are among forty-seven shots on NASA's schedule, which also includes seventeen satellite launchings.

THE NATIONAL BUREAU OF STANDARDS has established a research division, Radio Communications and Systems, at its Boulder, Col., laboratories. Together with the Radio Propagation Physics and the Radio Propagation Engineering divisions, it makes up the Central Radio Propagation Lab. The new unit will expand the R&D services provided for agencies which use radio communications.

ELECTRONICS AND COMMUNICATIONS EQUIPMENT was the third largest category of Defense Department procurement during the fiscal year ended June 30, 1958, following the categories of aircraft and guided missile systems, according to the DOD's latest semi-annual report to Congress. The category increased in total procurement value from $1.889 billion in fiscal year 1957 to $1.987 billion in fiscal year 1958.

A WORLD-WIDE SATELLITE COMMUNICATIONS NETWORK may be completed within four years, according to a report prepared for the House Space Committee by Lt. Col. Paul B. Schupperner, staff consultant. Under "Project Courier" which is the next step in the development of the communications system, the U. S. will attempt to place into orbit a satellite capable of receiving and storing messages from ground stations and then transmitting the information to other ground installations.

ENFORCEMENT OF ANTI-MERGER LAWS to keep competition alive in the electronics industry was called for by Robert A. Bicks, Acting Assistant Attorney General of the Justice Department's Antitrust Division, when he appeared before the Senate Judiciary Subcommittee on Antitrust and Monopoly and stated that Section 7 of the Clayton Act should be enforced.

CONTRACTS: ARMY: Fairchild Camera & Instrument Co., development of aerial reconnaissance system capable of taking, processing, and transmitting aerial photographs from an airborne vehicle to a ground station for immediate viewing, $923,500; General Electric Co., Seattle, Wash., production of three 7500-KW generators, $1,375,010. NAVY: Sperry Rand Corp., Remington Rand Univac. Div., purchase of electronic brain computer to be used aboard ship, $11,000,000; Westinghouse Electric Corp., Electronics Div., production of advanced shipboard radio transmitters for surface vessels and submarines, $7,000,000; Allen B. Du Mont Labs., Inc., development of extremely sensitive, lightweight television systems and controls for use in aircraft to provide reconnaissance capability at night as well as in daylight, approximately $230,000. AIR FORCE: Western Electric Co., Defense Projects Div., design and installation of a communications network in support of AF facilities in the Aleutian Islands, approximately $13,000.000; Republic Aviation Corp., Missile Systems Div., research and development of ballistic missile defense systems, details classified, in excess of $300,000.

— INDUSTRY —

THE SUBMARINE "GEORGE WASHINGTON" which was launched by the Electric Boat Co. at Groton, Conn., on June 9, is the first underwater craft designed to provide the Polaris ballistic missile with a mobile underwater launching platform. This nuclear-powered, 380-foot submarine is scheduled to become operational in 1960, when the Polaris missile also will become operational. The sub carries vertical tubes for the solid-fueled Polaris, conventional tubes for attacking surface ships or other submarines, and the most advanced electronic equipment.

THE AIR FORCE HAS SIGNED A CIVIL RESERVE AIR FLEET (CRAF) standby contract with Trans World Airlines, Inc., first of such contracts covering commercial airline operations for use in event of a national emergency—concluding many years of work on the part of industry and the government. Current emergency plans of the Department of Defense envision the use of approximately 250 civil aircraft to augment the capability of Military Air Transport Service's military forces. Negotiations must still be completed with 28 other U.S. commercial air carriers scheduled to participate in this CRAF program.

PACKARD BELL ELECTRONICS CORP. has received official Army Signal Corps recognition as a contractor qualified for RIQAP (Reduced Inspection Quality Assurance Plan). RIQAP operates through maximum use of the contractor's quality control and inspections, with minimum inspection by the Army Signal Corps. To qualify, a contractor must consistently produce with a quality that equals or exceeds the quality levels set by contract, and must maintain an effective quality control and inspection system. Packard Bell's qualification followed a review of quality control and inspection procedures practiced in the production of the TPA-3, a ground decoder unit for which the Technical Products Division is sole supplier.

COMINOL INDUSTRIES, INC., Washington, D. C., has acquired all of the outstanding stock of Granite State Machine Co., Inc. of Manchester, New Hampshire. Granite State is a large producer of countermeasures and shipboard antennas for the Defense Department, microwave and radar antennas for the electronics industry, and machinery for the paper box and textile industries. Cominol, which is developing a complex of companies in various electronics fields, plans to utilize Granite State as a key production facility in the over-all integration of its companies.

ALL OF THE ELECTRIC PIANO patents and inventions of Miessner Inventions, Inc. of Morristown, N. J., and of Benjamin F. Miessner, its President,have been acquired by The Wurlitzer Co. of Chicago. The electronic piano manufactured exclusively by Wurlitzer was introduced in 1955.

HEWLETT-PACKARD CO., Palo Alto, Calif., has acquired the Palo Alto Engineering Co., which will be a wholly-owned subsidiary of Hewlett-Packard. PAECO designs and manufactures a broad range of transformers, and Hewlett-Packard is one of the world's largest manufacturers of electronic measuring instruments.

SPECIALTY ELECTRONICS DEVELOPMENT CORP. is the new name of the Brooklyn, N. Y. company that was formerly known as Specialty Engineering & Electronics Co.

FEDERAL SYSTEMS, (FSD), the new division of International Business Machines, will be headquartered in Rockville, Md.—12 miles from Washington. FSD will consolidate all of the activities of Military Products Division which is presently in New York and the Washington Federal office of the IBM Data Processing Division. Under the new corporate organization, FSD will now be responsible for all sales of all equipment both commercial and specialized military systems to the Government—the civilian bureaus and armed forces. General Manager of the new FSD will be Charles Benton, Jr., formerly MPD General Manager.

VARIAN ASSOCIATES has formed a new research and development subsidiary to be known as S-F-D Laboratories, Inc. The new subsidiary will be located in northern New Jersey, and the top management will include five former Bell Telephone Laboratories engineers. Dr. Joseph A. Saloom has been named President. S-F-D will engage in development of microwave devices, emphasizing crossed field microwave tubes.

GENERAL ELECTRIC CO. AND SYLVANIA ELECTRIC PRODUCTS, INC. have increased their household and industrial light bulb prices. The boosts added two to four cents to the retail price of popular household bulbs. Both companies cited increasing costs of labor, materials and shipping for the price rises. The last GE price rise was 2 years ago and Sylvania's last price boost was in February, 1957.

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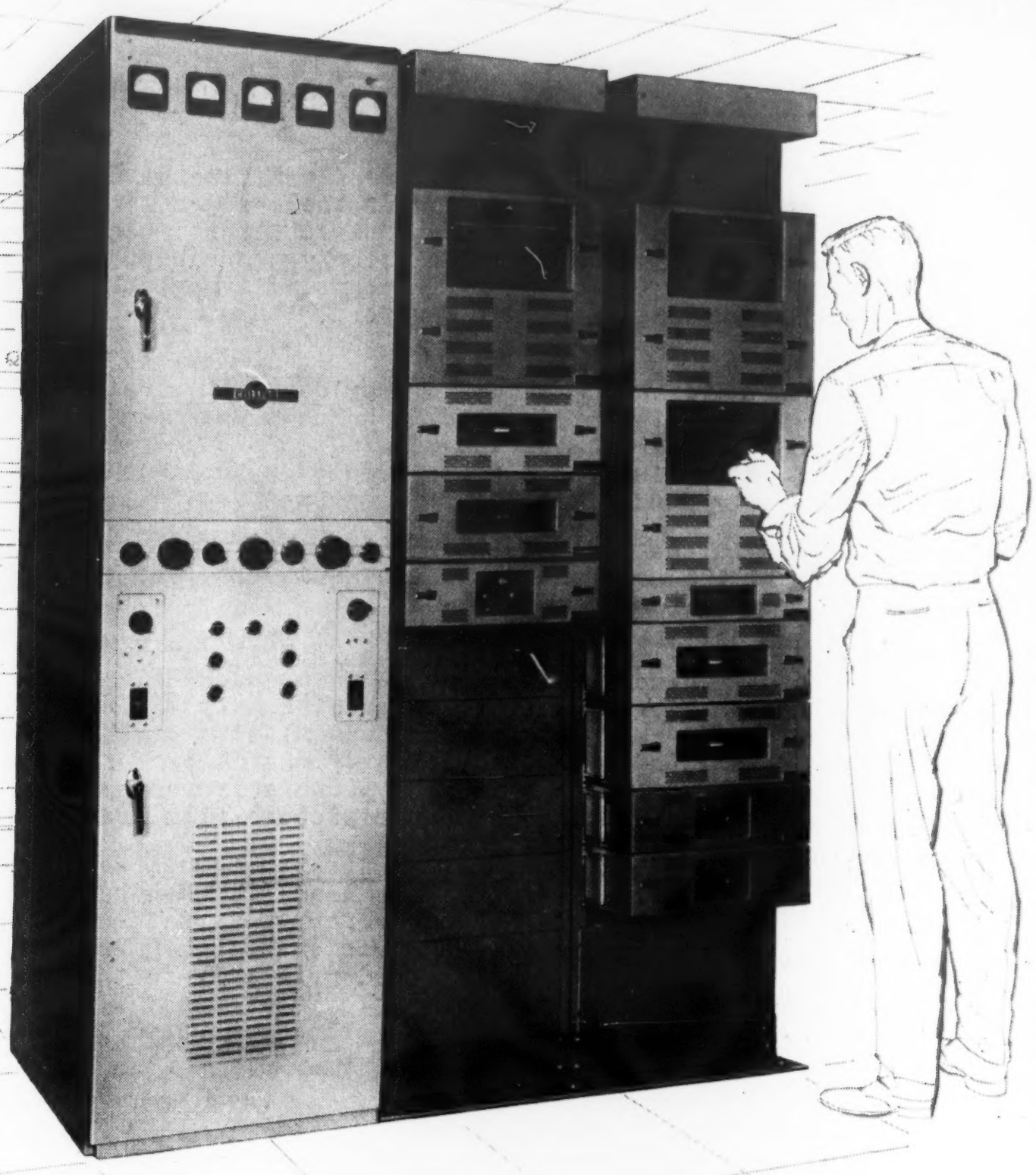

Typical Collins System for 10 kw:
204C-1 Linear Power Amplifier, 310F-6E
Exciter and 50E-6D Diversity Receiver.

simplified manual
tuning
for 10 kw
communication stations

COLLINS SSB

Integrated design of the full Collins single sideband line of power amplifiers, exciters and receivers provides a multiplicity of system combinations covering a wide range of output powers and frequency requirements. Here is one type of system that might be assembled for 10 kw peak envelope power output.

The linear power amplifier is the 10 kw 204C-1, offering RF feedback for low distortion, grounded screen for grid-plate isolation, and broadband neutralization. A unique feature of the 204C-1 is the ease of tuning provided by phase detectors which compare grid and plate circuits and indicate resonance on a zero-center meter. Loading is also accomplished by centering a meter pointer. Tuned circuits are continuously variable by front panel controls over the 4 to 25 mc range.

Excitation of the 204C-1 is accomplished in this example by a 310F-6E Exciter. Offering full manual coverage of the 2 to 30 mc range in 1 kc increments, the exciter is easily tuned to the desired frequency. Frequency stability of 1 part in 10^6 per month is achieved by a stabilized master oscillator phase-locked to an internal standard. Frequency standards with a stability of 1 part in 10^8 per day are available. A related diversity receiver with Mechanical Filter selectivity and minimized cross-modulation and blocking is the 50E-6D. A combined exciter-receiver, designated the 310F-6, is also available.

The equipment described is part of the complete Collins line of SSB equipment and accessories. Other equipment can provide from 100 watts to 45 kilowatts output with manual or automatic servo tuning. Write for literature or contact your nearest Collins representative for particulars.

COLLINS

COLLINS RADIO COMPANY • CEDAR RAPIDS, IOWA • DALLAS, TEXAS • BURBANK, CALIFORNIA

— GENERAL —

A MESSAGE VIA THE MOON was sent by President Eisenhower to Canadian Prime Minister John G. Diefenbaker and a recording of the message was played at the opening ceremonies of a new radar laboratory at Prince Albert, Saskatchewan, Canada. The message, described as the best transmission yet achieved of voice communications using the moon as a reflector, took 2.7 seconds to travel the 500,000 miles from the Millstone Hill Radar Observatory at Westford, Mass., to the moon and back to Prince Albert.

FCC HAM RULES have been amended to provide re-examination under Commission supervision of Novice and Technician ticket holders who take their licenses by mail. Section 12.45 (a) of Part 12 of the Commission's Rules was amended to enable the Federal Communications Commission to exercise closer supervision over mail-order licensees. Previously, only Conditional Class licensees could be re-examined by the FCC.

JULY 11, 1959 is the date of the 25th anniversary of the enactment of the Communications Act of 1934 and thus the 25th anniversary of the establishment of the Federal Communications Commission.

A FILMED IMAGE CARRIED OVER THE NARROW CHANNEL employed for voice transmissions was successfully demonstrated June 18 when Queen Elizabeth's London departure for Newfoundland was viewed on U. S. television over NBC networks. Previously, many channels have been required for the transmission of TV signals. The importance of this TV feat lies in the reduction of the number of lines in the picture tube from 525 to 200 and a change in film picture frames speed from 1 every 25 seconds to 1 every 8 seconds with every other picture film frame eliminated.

A 50,000 WATT NUCLEAR ENERGY REACTOR for biological research and medical treatment is to be installed in the Walter Reed Army Medical Center this summer. The reactor will be the largest available for the treatment of general hospital patients. Atomics International, a division of North American Aviation, Inc., designed this reactor which will be used primarily in the study of the effects of nuclear radiation in living organisms. The reactor will be self-contained, with no harmful particles, fumes or smoke being exhausted into the atmosphere or public disposal systems.

A COMMITTEE TO CARRY OUT TESTS AND STUDIES OF ELECTRONIC DEVICES for reporting of court proceedings is being appointed by the Chairman of the District of Columbia's 1959 Judicial Conference. Conference members were told it is possible that some day court proceedings may be recorded on television tapes that can reproduce every sight and sound of a trial for future reference. The committee will study the setting up of a new reporting system for Municipal Court in D. C.

"PROJECT DOUBLE JUMP," the first military-owned and controlled communications network to span Europe, links the Supreme Headquarters Allied Powers Europe (SHAPE), in Paris, with Naples (Allied Forces Southern Europe) and Izmir, Turkey (Allied Land Forces Southeastern Europe). Based upon the principle of reflecting very high frequency radio waves off ion layers beyond the earth's atmosphere, the system was supervised by the SHAPE Air Defense Technical Center and built by Page Communications Engineers, Inc., Washington, D. C.

CALENDAR OF EVENTS:

AUGUST 3-5: The Association of the United States Army is holding its annual meeting at the Sheraton-Park Hotel in Washington, D. C., with "What is a Modern Army?" as the convention theme. Military and Industrial exhibits will be on display.

AUGUST 4-6: "Requirements of Space Age Technology" is the theme for the Society of Photographic Instrumentation Engineers' annual convention to be held in the Los Angeles Ambassador Hotel, with 23 technical sessions and an Exhiborama of Equipment.

AUGUST 8-16: The 1st International Aviation & Air Industries Fair is to be held at the New York Coliseum highlighting avionics, world astronautics and space technology.

AUGUST 18-21: The 1959 Western Electronic Show and Convention will be held at the Cow Palace in San Francisco. WESCON sponsors the the Western Electronic Manufacturers Association and the San Francisco and Los Angeles Sections representing the Seventh Region of the IRE.

by
Maj. Gen. Harold W. Grant,
USAF
Director,
Communications-Electronics

(The following was a presentation to the Chamber of Commerce, Rapid City, South Dakota, on Armed Forces Day.)

strategic posture in the air age

The quality and effectiveness of the military forces of the United States and of our Allies are of paramount daily and hourly concern to free men in the tense atmosphere of world conditions today. Though our military posture is an around-the-clock problem, I feel that we should look more closely at our Services and assess our present position in the world conflict of ideologies. This is a conflict which means everything to the future of our nation and to each of us individually and to the unborn of future generations. It is an analysis of this position that I have chosen as my subject.

Before we can understand the reasons for many of the things our military services are doing and planning for the future, we must understand the basic position of our nation in today's world community and the national policies that underlie our daily actions. As a nation we are dedicated to the belief that war is no way to settle arguments. Our objective is to prevent the outbreak of a nuclear war which nobody will win—the ultimate termination of which could well be the destruction of civilization as we know it. There is only one potential or possible enemy who could engulf us in such a war. That enemy is the force of International Communism controlled from Soviet Russia. It is unfortunate that this potential enemy has adopted as an ideology, and consistently followed as a policy, world domination as the only acceptable method of coexistence. Make no mistake about this. Communism has not varied one inch in this basic policy in spite of temporary and brief intervals of Soviet cooperation and expressed intentions of peaceful coexistence. Recent events in Tibet should convince anyone that this is true—even those who may have forgotten what happened in Hungary.

Many of us are old enough to easily remember when the existence of a tyrant like Khruschev — halfway around the world — would have been of little or no concern to us here in America. But we have learned, at painful expense, that the world is actually a single community — that the health of the entire community is of vital concern to the future of us all. We — the wealthiest and strongest member of this community—must assume a major share of the responsibility for caring for the world's ills. Our assumption of this responsibility and concern for things like the shelling of Quemoy by Mao Tse-tung is what has put us squarely at cross purposes with the Soviets as long as they are bent on world domination. To be otherwise is to sit idly by and watch our way of life disappear by gradual absorption.

To prevent the spread of encroaching Communism in the world, we have adopted a national policy, backed up with a military strategy, called *deterrent defense*. This, simply stated, is to develop the capability to strike back quickly and powerfully enough to cripple to an unacceptable degree whomever hits us first. Remember then—if war does break out —nuclear war—we have failed in our basic objective which is to prevent just this from happening. The role of the Armed Services now becomes quite different from that of previous years, and far more complex. We have followed a policy of refusing to initiate aggression. We must therefore be able to absorb what Russia might initially launch against us and still retaliate with enough strength to inflict more damage than the Russian leaders are willing to accept. If we cannot do this we have no deterrent capability. Our strength will not prevent the war from starting. Also, just what is an acceptable or unacceptable blow in the mind of a tyrant like Khruschev? The possession of nuclear weapons on both sides and the constantly changing ability to deliver them, and our respective defense capabilities are but a few of the factors that must be continuously weighed in arriving at the answer to this question. This is the problem that keeps us awake nights. "Almost Enough," deterrent power is no defense at all. And we are all fully convinced that when Russia believes it can start a war and emerge from that war with enough force to still dominate what is left of the world, war will start. Notice that I say "when they believe they can." This is why it is so important that we make our policy and our strength adequately clear to them. Nothing could be more tragic than for war to start because Russia has misjudged our determination or our capability to retaliate.

I have been asked many times—has our national policy of deterrence been successful? I can only answer this by saying that as long as we have prevented this war from starting our policy has been successful. Will it

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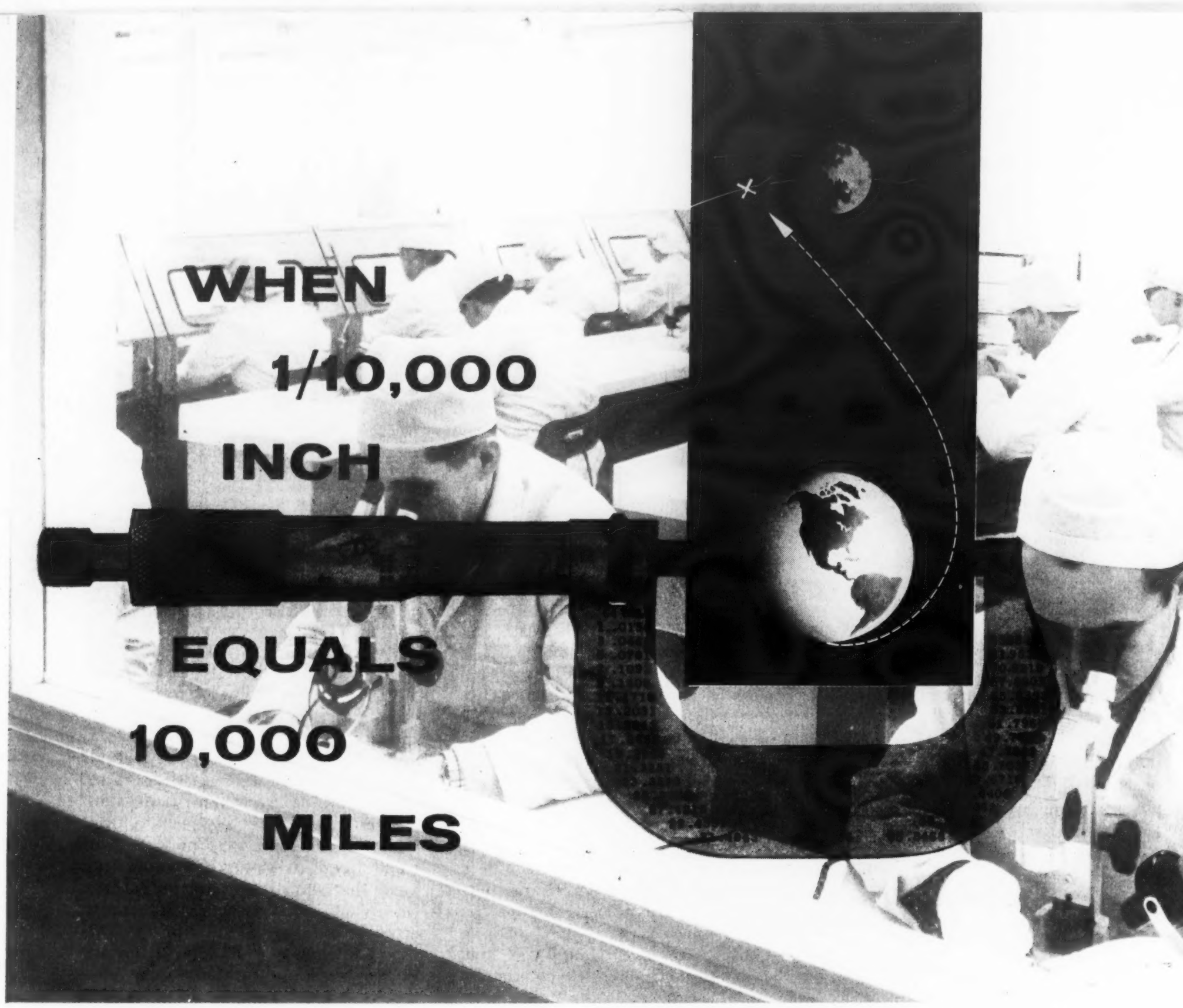

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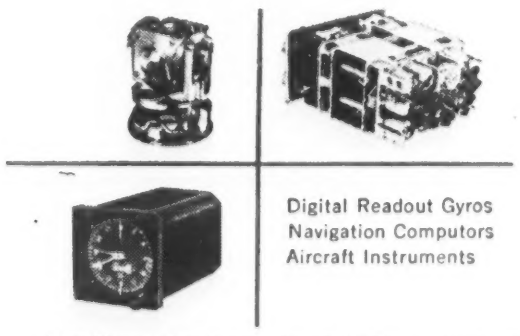

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succeed in the future? The answer to this rests on the shoulders of all of us. Since the end of the last war the primary deterrent power of the free world has been atomic and nuclear weapons plus the delivery capability of our Strategic Air Command. It is a grave responsibility that rests on the shoulders of your military and civilian community—a responsibility that does not lessen but grows more acute each minute of the day. I am convinced that history will attest to the role played by the Strategic Air Command in these trying times.

You have been hearing quite a lot about intercontinental ballistic missiles in the past year or two. You will soon have an operational unit, armed with one of our latest ICBMs, the Titan. With the advent of ballistic missiles, maintaining our deterrent policy becomes even more complex. Though our policy has been not to initiate aggression, we can, if we think the situation is getting serious, launch our aircraft toward their targets, allowing them to go only so far until the second word is given—the word to strike. If the alert is a false alarm, everybody comes home and it is just another exercise. It wouldn't make the headlines. But if it had turned out to be the real thing we have had a good head start! With missiles it is a different story. You can't recall a missile. You must be absolutely sure you are at war before you fire. For this reason we must have a positive warning system or we will not fire a single missile until enemy missiles or bombs are falling on us. The Russians, of course, know this quite well and will take full advantage when evaluating what they can do to us before we retaliate.

Role of Communications

I think right here is a good point to speak of another aspect of our Armed Forces operation, an area that is perhaps not as well known to you but one that is my daily concern and is extremely vital to our national effort. I am referring to ultra-modern communications and electronics. General Power, the Commander-in-Chief of SAC, recently told the Department of Defense Subcommittee of the House of Representatives Appropriation Committee that without adequate communications he commands nothing but the desk in front of him which has no lethal power at all. I have already mentioned the aircraft recall situation which SAC calls its "positive control" system. Imagine, if you can, aircraft in flight all over the world, carrying nuclear bombs, waiting for the word from Strategic Air Command Headquarters at Offutt Air Force Base to go ahead or to come home. Think back to my earlier comments about the delicate balance between having and not quite having a deterrent potential. You must realize that the sum total of our strike force is a composite of aircraft and missiles that are ready to fly, crews briefed and ready to act, weather conditions all over the world charted and countless other factors. All of this information must be fed continuously into the Strategic Air Command Headquarters at Offutt and other key control points. From this information, General Power can assess his strike potential and can advise the Joint Chiefs of Staff and the President. Remember that the President —alone—can order the use of Atomic Weapons. Just the problem of assembling this volume of information on aircraft maintenance, status of weapons, crews, and other considerations, is so large that we must emplov electronic computers to enable rapid display of this data to General Power in an immediate and usable form. As Director of Communications-Electronics for the Air Force I am specifically concerned with these aspects of our over-all fighting potential. The best brains in our country are being recruited to help us come up with electronic wizardry that can solve problems like this. I can report to you that we are solving them.

In a democracy that traditionally will not initiate aggression we realize that the key to our survival is early warning of enemy intentions. You can easily see that the earlier and more adequate our warning, the more effective will be our active defense measures and our retaliation. To improve this warning we have built a Distant Early Warning or DEW Line across Northern Alaska and Canada above the Arctic Circle. This system went into operation in July 1957, and with it we have moved our detecting radars as far out toward the threat as possible. I was present at the dedication two years ago and have visited most of these stations several times. I never cease to be awed by the fact that we have been able to transport complex and heavy equipment, install and get it into operation in the most inaccessible places on this continent. This is a lasting monument to the team of men from the Air Force and other Services, and from science and industry, who worked together under the most trying circumstances imaginable to finish the job in record time. The existence of this line and its ability to report back instantly any aircraft that approach it has improved our defensive and retaliatory position tremendously. The dedication of the United States Air Force men, the Royal Canadian Air Force men, and the civilians of both countries who are manning these sites around the clock under the severest of conditions is a tribute to the determination of free people to remain free. This is a determination that I am sure is giving Mr. Khruschev no comfort.

The introduction of ballistic missiles into the scheme of things poses another and even more severe test of our electronic ingenuity. To detect possible Russian launching of missiles toward Canada and the United States, the Ballistic Missile Early Warning System is being built. This project, called BMEWS, is essentially a very long range system which sees missiles as they pass through its beams, and determines direction of flight and trajectory. All of the problem associated with detecting and reporting aircraft along the DEW Line are compounded in BMEWS. In the first place the speed of missiles compresses the time available to do something from a matter of hours to minutes. The reliability demands on the communications reporting back to our strike force and defense headquarters are staggering. But the collective electronic, scientific and engineering know-how of this country is meeting this challenge too! In fact, in almost all facets of military operations today we are turning to electronic devices for our answers. As things happen faster, as larger and larger volumes of information must be processed, and the need for accuracy becomes more and more acute, the capability for human reaction is exceeded. The answer is found in complex electronic devices to assist man. Our modern military forces today are almost completely dependent on communications and electronics. I never cease to be amazed at new things being done with electronics, and although I work in this area every day, I am hard pressed to keep abreast of current developments.

Even more astounding is the impact that earth satellites and space vehicles are going to have on communications and electronics. We know already that satellite communications relay stations, weather observation stations and the like are practical solutions to some of our most pressing and as yet unsolved problems. The demands for globe-circling channels of communications

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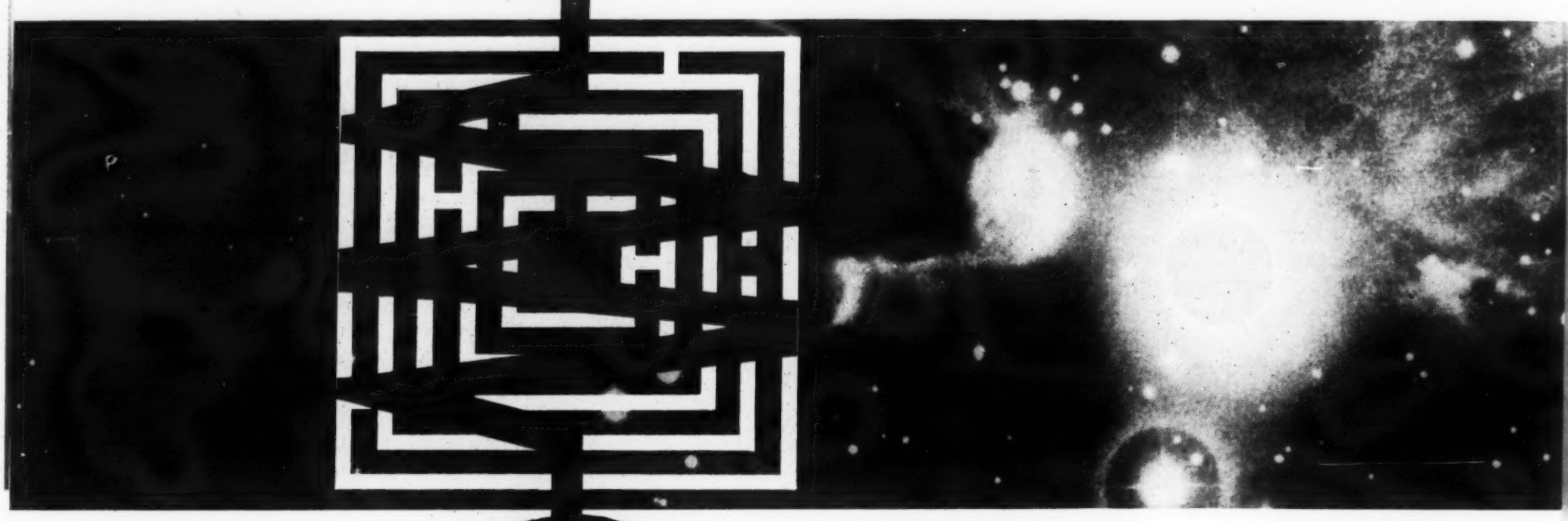

COMPUTATION FOR THE SPACE AGE

EXPEDITIONS INTO SPACE FOLLOW TRAILS BLAZED BY COMPUTATION SPECIALISTS. IN THIS HIGH SOPHISTICATED TECHNOLOGY, BURROUGHS CORPORATION'S DEMONSTRATED COMPETENCE RANGES FR BASIC RESEARCH THROUGH PRODUCTION TO FIELD SERVICE AS PROVED BY PROJECTS SUCH AS THE FORCE ATLAS. BURROUGHS CORPORATION IS EQUIPPED BY ABILITY AND ATTITUDE TO FUNCTION A TEAM MEMBER—A CLEARCUT RECOGNITION THAT EVEN IN THE REACHES OF OUTER SPACE, THE SHORT DISTANCE BETWEEN TWO POINTS IS SINGLENESS OF PURPOSE APPLIED TO MUTUAL OBJECTIVES.

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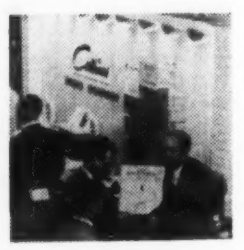

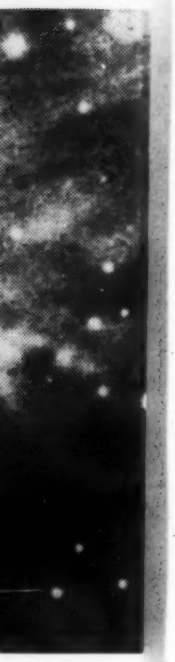

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* **ANOTHER SUCCESSFUL AFCEA CONVENTION WILL BE HELD IN 1960**

MAIL BY MISSILE

(The following is a statement made by Postmaster General Arthur E. Summerfield concerning the first known official use of missiles by the Post Office Department of any nation.)

THE United States recently began experimental exploration of a major new technique of communication that is of historic significance to the peoples of the entire world.

A guided missile, on a routine training flight at approximately the speed of sound from an American guided missile submarine at sea, landed successfully on our East Coast with a shipment of United States Missile Mail.

This peacetime employment of a guided missile for the important and practical purpose of carrying mail is the first known official use of missiles by any Post Office Department of any nation. An unofficial test flight of a similar Regulus I on the Pacific Coast was made several months ago.

These developments are a reaffirmation by the United States of its humanitarian aims, as eloquently emphasized by President Dwight D. Eisenhower, that the scientific achievements of our people shall be used as a rich legacy of progress for mankind.

This shipment of mail by missile has given us extremely valuable information of far-reaching importance to the future of the United States mail service, namely:

1. The use of compartments built into missiles to carry considerable shipments of mail appears highly practical.
2. Significant quantities of mail can be loaded quickly and efficiently into missiles.
3. Missiles can be developed to carry mail safely and swiftly.
4. The relative lightness of letters and the small space they occupy make them ideal users of missile technology.
5. Guided missiles may ultimately provide a solution to problems of swifter mail delivery for international mails, for isolated areas where other transportation is infrequent, as well as a supplementary high-priority service to big population centers.

The first U. S. Post Office Department official Missile Mail experiment, delivering approximately 3,000 letters, was loaded aboard the Guided Missile Submarine *USS Barbero* (SSG-317) at Norfolk, Virginia, shortly before departure on a regular training mission. A branch Post Office was established on the *Barbero* by my official orders at that time.

On June 8, 1959 the crew of the *Barbero*, while in the international waters of the Atlantic Ocean, dispatched this historic shipment of U. S. Mail on a Regulus I Training Guided Missile, flying the missile successfully to its destination at the Naval Auxiliary Air Station at Mayport, Florida, near Jacksonville, where it landed safely a few minutes later.

The first Missile Mail was carried in two metal compartments, painted in the Post Office Department's official mail-box colors of red, white and blue.

As our studies proceed on the effective utilization of guided missile techniques for mail delivery, we can expect further experiments to develop the feasibility of our plans and add to our store of knowledge of what we informally call our "Pony Express II Missile Mail Project."

The successful Missile Mail experiment became possible only because of the close cooperation of Secretary of Defense Neil H. McElroy, the fine personnel of the Department of Defense and the Navy, and our own dedicated Post Office Department people, all working closely together. The Post Office Department is also deeply indebted to Lt. Commander Carlos Dew, USN, Commanding Officer of the *Barbero*, and the other officers and members of its capable crew.

The letters which arrived via the Regulus I flight at Mayport, were immediately processed in the Jacksonville, Florida, Post Office for regular dispatch to officials and leading citizens who have contributed to, or shown special interest in the postal progress of recent years, including: the President, the Vice-President, Members of the Cabinet, other top Federal Officials, Members of Congress, Justices of the Supreme Court, Governors of the States, including Alaska and Hawaii, the Smithsonian Institution, the Postmasters General of the 99 other member nations of the Universal Postal Union, members of groups associated with the Postal Service, such as the Post Office Department Advisory Board, and the officers and crew of the *Barbero*.

The envelope used was my official one with a pictorial cachet of the Regulus I bearing the wording "First Official Missile Mail—U. S. Post Office Department" placed to the left. A cancellation reading *USS Barbero* with the date and approximate time of launching of the Regulus I from the submarine was used on the cover. The letters were appropriately franked with the red, white and blue 4¢ American Flag Commemorative Stamp issue of 1957. On the reverse side of the envelope a backstamp was applied showing the approximate time of the receipt of the mail at the Jacksonville, Florida Post Office prior to its dispatch throughout the world.

Each Missile Mail envelope carries a letter from me, as Postmaster General, USA. I would like to emphasize now what I said in the letter, that the great progress being made in guided missilry will be utilized in every practical way by the Post Office Department.

I believe we will see Missile Mail developed to a significant degree before man has reached the moon.

This experiment with Missile Mail is in line with the finest traditions of the Post Office Department in pioneering with new means of transportation to speed the delivery of the mails.

In colonial days, Benjamin Franklin took the mail from horseback and put it on coaches; in 1831 the Post Office Department was the first to use the 'new fangled' trains; in 1858 the Post Office linked the nation with the famous Overland Mail stage service to be followed in 1860 with the even faster Pony Express. In 1918, when most people still thought the airplane was an unworkable contraption, the Post Office Department demonstrated its practical peacetime uses with the first regular air mails.

This Missile Mail will go down in history as another saga of progress and achievement in our national heritage.

the need for productivity thinkers

by **A. LIGHTFOOT WALKER**
President, Rheem Manufacturing Company

PERHAPS TWO KINDS of business thinking have emerged during the period of business recession we are just passing through.

One we might call the "back-to-normal" thinking.

Men with this philosophy may have successfully guided their companies through this difficult period, carried out economy drives, and brought along good men in their organizations equal to the crisis. They may have trimmed the fat, cut overhead and increased inventory turnover.

But the "back-to-normal" thinker can't wait for the business upturn. Nor can anyone in his organization. Lip service to the contrary notwithstanding, everyone in the company knows the lid will soon be off.

Under "back-to-normal" leadership, general increases will automatically go into effect. Bonuses will be hiked. Labor disputes will be settled *now* so as not to stop production. Requisitions for extra help will be approved. The fat will begin to build up again.

Yes, if the "back-to-normal" attitude prevails, today's gains will quickly be frittered away.

The reverse of this is "productivity thinking." The "productivity thinker" has not only learned something lasting from the recession experience but what he has learned is now firmly ingrained in his thinking and approach. Looking at his organization, he sees it knit together by a sound team spirit. People are really working in his company. The non-contributor is gone. Gone also is the "something for nothing" frame of mind. In its place is honest satisfaction in—and honest reward for —achievement and good performance.

The "productivity thinker" believes that "productivity" not "normalcy" is the goal. And because *he* believes this, so does everyone in the organization.

His is the company that will grow and prosper. The more companies like his we have, the more our economy will reflect growing productivity.

This, I suggest must be management's answer to the challenge to our private enterprise system—the challenge that Mr. Khrushchev has thrown down to us in these words:

"We declare war. We will win over the United States. The threat to the U. S. is not the ICBM, but in the field of peaceful production. We are relentless in this and will prove the superiority of our system."

So, in this article, I should like to discuss the questions: How can we develop "productivity thinkers"? And how can we keep them that way?

Perhaps our experience in Rheem in the last 2 or 3 years may provide a helpful example.

Rheem Manufacturing Company—as far back as 1956 —began to fight the recession of 1958.

This is not a claim to clairvoyance. We did not know there would be a business recession in 1958.

We encountered in that earlier year a serious corporate management and financial situation. The measures we took then corrected defects in the company. They also cushioned the effects of the recession when it did come. And they strengthened us for the hard job of growth and development that lies ahead.

Our critical situation in 1956 demanded immediate and basic changes in company organization, business objectives and management methods.

Rheem was forced to adjust its organization and philosophy to its growth. Our company by 1956 had grown in 32 years from a small steel galvanizing shop in California to a world-wide company comprising some 35 plants in the United States and abroad. It had shown a profit every year. And it was selling close to two-hundred million dollars annually in a wide range of products—steel shipping containers, water heaters, heating and air-conditioning equipment, plumbing fixtures, kitchen ranges, auto parts, aircraft components and electronics—among others.

But the Rheem organization structure was not adequate to the demands placed upon it by a growing, complex business.

When the financial crisis came toward the end of 1956, a new management took office. It did several things. It overhauled the organization structure; it installed qualified people in key jobs; it refinanced debt, and it put into effect programs to improve profits and reduce costs.

The results were encouraging. In 1957 the company went from a 16-million-dollar pre-tax loss of the year before to earnings of almost three-and-a-half million before tax. Inventory turnover rate was increased from four to six times annually. Corporate interest and overhead costs were reduced by two million dollars at an annual rate. Long-term and short-term debts were cut $25 million.

It could be fairly stated that Rheem Management had met a serious crisis successfully. It is conceivable that the record might have lulled some of us into an easy and comfortable state of mind—except for two things. First, the straws of recession in the wind that began to blow in the Spring of 1957. Second, Parkinson's Law.

Parkinson's Law states that the number of people in an organization will grow at a predetermined rate regardless of the amount of work to be done. Parkinson's Law was originally intended to apply to government but it soon became apparent that it applied to all business—a some-

what embarrassing fact for all of us to discover.

In any event, we believe that we have benefited from our prerecession "head start." We gained by having developed a "productivity" frame of mind and a fund of experience suited to the particular times we now hope to leave behind us. And we believe we are suited to a period of national economic recovery and growth.

There has been a big lesson in our experience of the last two years—certainly for us and perhaps for others. It is this: the need for increasing productivity is permanent, not temporary.

The temptation is strong in prosperous times to add staff and facilities or services that are not really productive. But even in good times the entire organization pays a penalty for this crippling and growth-stifling waste. And then when times are bad, staff must be laid off, morale suffers and the penalty of waste—of low productivity—is compounded.

Management's assignment is to preserve the gains made in hard times, and then to build upon them for even greater productivity. It is a continuing program.

With the help of others who have given much thought to the question, let me try to define this idea of "productivity," and then discuss the guideposts we at Rheem have erected toward the goal of further increases in productivity, and finally comment on the stake that our nation—indeed our way of life—has in increasing productivity.

I hope these thoughts may contribute something to those who are interested in where we in management stand and where we are going.

Productivity—A Broad Concept

A moment ago I said that management's assignment now is to preserve the gains made and to build even more productivity.

This is surely the essence of the management function—to maintain that delicate balance between all the elements of production that will give the greatest output for the effort expended—in good times and bad.

As Peter Drucker, the management consultant and author, says, the administrative function of business is to utilize productively its wealth-producing resources. And, he says, the enterprise must control these resources to discharge its purpose of creating a customer.

Productivity in this sense goes far beyond the classic accounting approach, which attempts to measure only output per worker.

Actually, as the lesson of the recession shows so well, true productivity means creating customers by finding better ways to do things. That, I suppose, is what Mr. Drucker means when he says the enterprise must control its wealth-producing resources.

Some of these are factors of output familiar to all of us and subject to some measurement such as investment, capital expenditure, direct and indirect labor cost, materials, overhead, distribution and so forth. Others are intangibles not measurable and yet vital to productivity.

Take quality, for example, an intangible wealth-producing resource.

Consider a manufacturing company squeezed between rising costs and more demanding markets. It seeks a way out of its dilemma through short cuts—perhaps using a little cheaper material which will affect the quality of the product. Will this hurt its sales? The risk today is certainly great.

The customer, who is king today, can afford to be selective. He is besieged with offers because manufacturers are so keen to sell their products. In another earlier day, anything with a broad "V" on the front was a Cadillac and therefore desirable. Now, the customer insists on a Sunset Yellow color, and he inspects the chrome for scratches.

The manufacturer knows that productivity depends on his achieving a balance between what is marketable quality and what may be a "short cut" at the expense of quality. That is one critical management decision.

Productivity is proper balance in countless decision. Is it more productive to run that Number Five press a single shift or two? Should you take on product "X" to round out your line? Who is right about your warranty, you or your dealers? Should you buy that new plant? Is manager Jones in the right job? Yes, every management decision affects productivity.

Productivity is the balance of factors that will gain the highest output for the effort expended. As such, it is obviously a measure of the calibre of management. It is a goal to be pursued—never to be fully attained—in good times and bad.

Under the pressure of a recession, many companies have achieved a high level of productivity—of proper balance in the factors of production.

Will they tend to backslide into the old comfortable ways as a business keeps improving? Will their much-touted "economy drives" soon be called off?

Or have they somehow made their fundamental gains in productivity a part of their policy, their corporate ways of life, their growth and development? Have they impressed on their people—at levels of organization—"productivity thinking" rather than "back-to-normal" thinking?

At Rheem, we have weathered first a financial crisis and now an economic crisis. We have developed an organizational structure and the mechanics for growth and development that we expect will assure "productivity thinking" for some time to come.

Sound Organization and Management Programs

I am going to discuss briefly our organization structure and concept because it is the hook on which our "productivity thinking" hangs.

Naturally, every company must develop an organization structure suited to its needs.

Our wide geographic dispersion and product differences make a decentralized organization of product divisions natural.

At the corporate level, we established a key management decision-making group. Broad powers are delegated to it by the Board of Directors. The Executive Management Committee in turn holds product division managers responsible for profitable operation. These managers set their own targets which are approved or modified in consultation with the Executive Management Committee. Then the division managers are on their own, subject to corporate budget and accounting controls.

A few words on controls. They are essential in decentralized management. To the extent that they are self-imposed so much the better. But without controls, any situation will eventually get out of hand, even though there is all the good will in the world.

This philosophy—which we call "maximum autonomy with maximum control"—encourages decision-making all the way up and down the management ladder. The effect on productivity is measurable for there is no need to duplicate staff at various levels. For example, once controls are clear and reasonable, a marketing decision, say, can be made at a division or plant level without need for a corporate decision.

Emphasis is placed on performance in the organization

(*Continued on page* 38, *column* 1)

The Need For Productivity Thinkers

(*Continued from page* 36)

structure. Every job has responsibility assigned to it. We avoid "assistant managers" or "coordinators." They cut down on productivity.

When a man is given real responsibility in his job, his respect for the company and for himself goes higher. He is on his own to achieve goals that he himself has helped to set. We feel sure that our managers have not adopted a "back-to-normal" attitude. They are "productivity thinkers" because they want to be and because they see that others are.

A small corporate staff directs company-wide functions —such as purchasing and industrial relations—and they work with the corresponding division people. The staff is also available to divisions in special situations. But essentially, the Executive Management Committee and corporate staff are freed from day to day operating problems and may devote more effort toward company-wide problems.

Communication Important

Decentralizing requires management to encourage channels of communication vertically between divisions and the corporation, and horizontally between divisions themselves and between corporate staff departments. Horizontal communication is often neglected. Yet at certain organization levels it is as important as any communication.

Corporate departments, for example, can no longer work in isolation from one another. Purchasing today is everybody's business, as are industrial relations, accounting, planning and public relations.

As executives of your own companies, you know the frequent complaint: "Isn't there some way that those fellows in that department can let us know when they plan to do that sort of thing?"

Horizontal communications today are vital to decision-making—to "productivity thinking." Very few important corporate decisions can be made intelligently by sudden edict or by a chief executive in isolated contemplation. They result mainly from the give and take of ideas based on carefully collected and collated facts all requiring good communications.

We do not pretend to have solved our communications problems at the management level—within divisions—or at any organization level. Communicating, too, is a continuing job. Good communications cost money. They require skilled manpower. They take many forms. But they make up one of the intangible efforts that must be weighed in the scale of productivity—and must be worked everlastingly.

While on the subject of communications, the most effective program I know of takes no paperwork. It has to do with quality speaking for itself. Although a little removed from the question of communications among organization levels, as I have referred to it here, it is a point worth mentioning.

There is no better way to increase productivity than to have a superior product that intrinsically commands the respect and pride of all who are associated with it.

In our own experience we have found that by improving the quality and finish of a product, we get less spoilage and more production.

Forward Planning Programs—A Productivity Key

"Productivity thinking," it's true, depends on a sound organization structure, proper incentives and controls, corporate backing and good communications programs.

(*Continued on next page*)

An Engineer Looks at Economic Warfare

(*Continued from page* 8)

water resources development. Their programs are extremely large in size and comprehensive in scope and are directed to the fullest possible capitalization of the tremendous hydro resources behind the Iron Curtain.

The USSR is progressing much faster than either the European or Asian satellites. Large scale plans for Red Europe are concerned chiefly with multinational projects for the Danube River, where the forceful methods of the Communists may push aside political difficulties which in the past have handicapped the harnessing of that river.

Their most important European site is at the Iron Gate, shown in Figure 6 (p. 9), where the Danube breaks through the Carpathian Mountain range in a deep gorge only 550 feet wide. This is one of the great dam sites of the world. Here Yugoslavia and Rumania intend to build a 2,200,000 KW plant about the size of the Niagara plant, now under construction by the New York State Power Authority (2,190,000 KW). The Yugoslav-Rumanian plan calls for 12 generators driven by turbines that would exceed in size any now in existence.

Thus far the Red Chinese have succeeded in building only about 400,000 KW of new capacity and their largest project completed thus far is the 60,000 KW Shang-Yu Chiang plant north of Canton. However, the Red Chinese are at work on the 1,100,000 KW San-men Hsia plant and the 1,050,000 KW Lui-chia Hsia project, both on the Yellow River, where they are combining hydro development with massive flood control.

The potential hydro resources of China are estimated at more than six times the potential of the United States. Some 40 percent of this potential is in the densely populated basin of the Yangtze River in central China.

One of the most famous Chinese sites is at I-ch'ang where the United States was helping the Nationalist Chinese to plan what was to have been the world's largest multi-purpose dam before the Reds seized control of that country. This project, as previously planned, would have incorporated power, flood control, navigation and irrigation and undoubtedly would have exerted a revolutionary influence over the economy of the region.

Red Asia, however, is handicapped in the development of power capability at the present time for lack of means to produce the equipment required, and must depend upon the USSR and European satellites for this support.

In their eagerness to speed up power production for industrial expansion to support their race against the West, the Soviets have slowed down hydro development for the time being and have expedited the construction of steam plants. On a test stand at a factory in Leningrad, the Soviets have their largest thermal turbine, which has a capacity of 200,000 KW. While they have shown themselves capable of building large steam units, their equipment in this field is still considerably inferior to our own. They are concentrating on the standardization of plants and on mass production of large units.

The largest steam turbine now in operation in this country, operated by Consolidated Edison Corporation, in Chicago, has a capacity of 325,000 KW. General Electric Corporation, and Parsons Company of England are each building a 500,000 KW plant for the Tennessee Valley Authority.

In part II of his article which will appear in the August issue, General Itschner discusses the threat posed by the Sino-Soviet development of water resources and strongly urges that we gear our planning to long range economic conflict and to a program that will support our own requirements for economic expansion.

Strategic Posture

(*Continued from page* 31)

is a natural outgrowth of the global nature of our military operations and, in fact, our national life. We are rapidly reaching the limit of known techniques for providing the right type of communications over long distances. Requirements that used to be satisfied by teletype channels now require voice, data or facsimile. The communications satellite seemed tailor made and perfectly timed to fill this gap. What the future holds in communications marvels made possible by satellite relay systems, I can only guess. Certainly world-wide high capacity telephone service and television are not at all beyond the realm of possibility.

I have specifically mentioned a few of the areas in my specialty of communications and electronics to illustrate how highly technical and complex our life is becoming. The technical lead over Russia of which we often speak, is really our lead in discovery and exploitation of new ways of staying strong. As we move out into space everything becomes more complicated. World leadership cannot be maintained by complacency or half-hearted effort. It is obvious that we cannot maintain the lead in world technology unless we train and utilize all the brain-power available to us. The ability of this nation to deter aggression is the sum total of our capability as a nation. The time when our international strength could be measured in military forces alone has long since passed. Science and technology will get us out into space and will enable us to meet the problems we will face there. It will give us the position of pre-eminence over any nation or ideology that would like to dominate space so that they can dominate the world. We have that pre-eminence now. We have the ability to maintain that position. We must have the will and determination to work hard and to sacrifice to maintain it. This is the most severe test that has ever faced any nation.

I have a deep and lasting faith in America and the system of government we have adopted here. It is an unavoidable fact that we have inherited the very heavy obligation of insuring that freedom and decency are the inalienable rights of every man. It is the freedom of all mankind that is at stake. We cannot fail a challenge of this magnitude.

The Need For Productivity Thinkers

(*Continued from preceding page*)

It also depends on positive, clearly-stated and widely-understood objectives and policies of growth and development.

We have formalized such a statement in a booklet distributed to every manager in the company.

The process of writing these things down actually contributes to productivity because it helps precise thinking. Confusions and misunderstandings about loosely stated policies are cleared up. And although the final result may at least in part appear to be stating the obvious, it offers morale-building evidence of the sincerity of management motives and intentions.

We place particular emphasis on specific objectives, which focus on developing and maintaining plant operations which have the potential of returning pre-tax earnings of 30% or more on investment. This provides a measure of achievement toward general objectives. We have defined carefully what we mean by "investment." It comprises three things—(1) total fixed assets less depreciation, (2) inventory, and (3) accounts receivable. The investment base we have chosen, which is different from net worth, has been selected in the belief that management should have an incentive to make all assets productive. In other words, it is an integral part of "productivity thinking." I might add that a manager's progress toward these goals is reflected in his own incentive compensation.

Another area of emphasis in this statement is on the Research and Development, and Growth and Acquisition departments. These departments are assigned the tasks of developing new products for Rheem to sell. They do not replace such programs in divisions. They supplement them by offering means of better coordination, exchange of information and use of talent. "Productivity thinking" requires much forward planning and hard work. "Productivity thinking" requires proper investment of facilities and effort in research and development—because we are interested in productivity *tomorrow* as well as today.

"Productivity Thinkers"—Our Answer to the Red Challenge

Vice President Nixon made a speech at the 50th Anniversary Conference of the Harvard Business School Association several months ago.

"Of all the great industrial nations," he said, "the United States, the strongest defender of private capitalism, is the one which has come the closest to achieving the socialist goal of prosperity for all in a classless society. We have achieved the wide distribution benefit claimed by socialism while avoiding the controls and restrictions on freedom inherent in a socialist system. And this has happened not because we took from the rich and gave to the poor but because we gave everybody an opportunity to share in a constantly increasing pool of wealth."

This should be answer enough to a Khrushchev who declares war in the field of peaceful production.

But it is not. For we cannot afford to rest upon our laurels. The great strides in productivity that have brought us to our leading position will not continue because of some supposed superiority of American know-how, by some magic or stroke of good fortune. They will continue as they began—by hard work. And work, I might add, of the brain, not only the brawn.

Our productivity gains to date reflect the replacement of brawn by brains. This, of course, is a great fallacy of Marxism—the fallacy that the only productive labor is that measured by sweat and muscle. Today's productivity reflects technical and management achievement. We may be sure this will continue to be so.

Now is the time for us to emphasize the great opportunities of the future, whereby all members of our society may share in the benefits of common effort. We must rise above the trap that Marxists would set for us, the claims that there is a gulf between owners and workers, that there must be conflict. In America, we know there is no faceless worker, no faceless owner.

So let us no longer talk of "victory"—or "winning"—when in organizations of large size we encounter conflict of interest, be it with unions, government or other groups with whom we must deal. Let us stress the tremendous positive aims and gains of our system, not temporary differences that may arise among groups that really work together to make our system sound.

Our responsibility is to resolve the group demands that are made on the corporation—to balance the elements so that there will be maximum output for effort expended so that there will be productivity in its truest sense.

For the good of business, the people and our nation—management's job now is to encourage "productivity thinking."

Association affairs

AFCEA's New President

Benjamin H. Oliver, Jr., a former Vice President of AFCEA, was elected as National President, AFCEA, for the 1959-60 term by the Board of Directors at the Association's 13th Annual Convention June 4, 1959. Mr. Oliver, Vice President of New York Telephone Company, succeeds Rear Admiral Frederick R. Furth, USN (Ret.), Vice President in Charge of Research and Development of ITT Corporation.

A biographical sketch of Mr. Oliver will appear in the August Convention Report Issue of SIGNAL.

Oliver Addresses N. Y. Telephone Convention

Benjamin H. Oliver Jr., AFCEA National President, was the principal speaker at the 37th Annual Convention of the New York State (Independent) Telephone Association, held at Schroon Lake, N. Y., on June 16.

To facilitate customer dialing of long distance calls, Mr. Oliver announced the trial of selected letter designations instead of conventional central office names for Buffalo and other New York upstate central offices. The plan features a single letter for each dial pull and uses the letter which is strongest phonetically for a particular pull.

In reviewing the background which led to this trial, Mr. Oliver pointed out that studies have shown that the majority of customers who display their numbers in advertising and other media are showing only two letters, and also that there is an increasing tendency among customers to use letters, instead of names, in passing their calls to operators.

British Press Speaker

Fred E. Meinholtz, veteran director of communications for *The New York Times*, spoke at the 50th anniversary meeting of the Annual Conference of British Commonwealth Press Union in London, June 9. A frequent contributor to SIGNAL, he was the first foreign speaker in the history of the organization to speak at its meeting.

Allied Members

By action of the Board of Directors at the 13th AFCEA Convention, all Foreign Associate members will now be known as *Allied Members*.

AFCEA's General Manager

SIGNAL's Editor, Colonel W. J. Baird, USA (Ret.), has been appointed General Manager of AFCEA's National Headquarters. Colonel Baird will take on the added administrative duties of this newly created position while retaining his editorial post.

Colonel Baird joined AFCEA as Editor of SIGNAL in September 1956, upon his retirement after 30 years in the military service.

New Group Members

Instruments for Industry, Inc.

Instruments for Industry, Inc., a manufacturer of wide-band amplifiers, has become a group member. This military electronics company is located at 101 New South Road, Hicksville, Long Island, New York.

IFI representatives are: E. H. Swanson, President; R. C. Lockwood, Vice President; E. B. Novikoff, Vice President of Engineering; J. T. Daley, Contracts Administrator; J. S. Crum, Controller; R. D. Billhimer, Ass't to Vice President; J. J. Michel, Engineering Administrator; L. I. Algase, Chief Engineer; I. Goodman, Staff Engineer and A. X. Rubin, Staff Engineer.

Radio Frequency Laboratories, Inc.

Radio Frequency Laboratories, Inc., a manufacturer of communications equipment, has rejoined AFCEA as a group member. Located at Boonton, N. J., the company was a group member from 1954 to 1956.

The following officials will represent the company: E. G. Gilbert, Chief Engineer; M. H. Emker, Vice President, Communications; R. H. Denton, Vice President, Government Contracts; C. Higgens, Senior Engineer; R. J. Gilman, Chief Communications Engineer; G. King, Project Engineer; R. Treible, Applications Engineer; E. H. Schober, Sales and Systems Engineer; K. Shay, Junior Engineer, and H. Blackman, Systems Engineer.

AFCEA's Newly Elected Officials

President

Benjamin H. Oliver
Vice President, Upstate
New York Telephone Co.

1st Vice President

Rear Admiral Frank Virden, USN
Director, Naval Communications

2nd Vice President

Major General Harold W. Grant, USAF
Director of Communications-Electronics

3rd Vice President

Major General Ralph T. Nelson
Chief Signal Officer, USA

4th Vice President

John W. Inwood
District Manager
Western Union Telegraph Co.

5th Vice President

Ben S. Gilmer
President
Southern Bell Telephone & Telegraph Co.

Regional Vice Presidents

Glenn D. Montgomery, Region A
Defense Coordinator,
American Tel & Tel Co.
Long Lines Dept.

George C. Ruehl, Jr., Region B-1
President
Electronic Aids, Inc.

Paul H. Clark, Region B-2
Manager, Dayton Office
Radio Corporation of America

W. Kelly Mosley, Region C
Assistant Vice President
Southern Bell Tel & Tel Co.

Harry Reichelderfer, Region D
Assistant Director
Southwest Research Institute

Walter H. Pagenkopf, Region E
Vice President
Teletype Corp.

Ray E. Meyers, Region F
Manager, Radio Operations
Lockheed Aircraft Corp.

Secretary—Julia B. Godfrey

Treasurer—W. Earl Trantham

Directors

1960

Francis L. Ankenbrandt
Administrator, Global
Communications Program
Defense Electronics, RCA

Percy G. Black
Vice President
General Telephone Service Corp.

Theodore S. Gary
Vice President
General Telephone & Electronics Corp.

John J. Hanselman
Assistant Vice President
American Tel & Tel Co.

Charles F. Horne
Manager
Convair

David R. Hull
Vice President
Raytheon Co.

J. Harry LaBrum
Attorney
LaBrum & Doak

David Sarnoff
Chairman of the Board
Radio Corporation of America

1961

Harry E. Austin
Vice President
RCA Communications, Inc.

Roland C. Davies
Editor
Telecommunications Reports

E. K. Foster
Vice President & Gen. Mgr.
Bendix Radio Division
Bendix Aviation Corp.

Francis H. Lanahan
President
International Electric Corp.

Joseph R. Redman
Consultant
Western Union Telegraph Co.

Robert C. Sprague
Chairman of the Board
Sprague Electric Co.

W. Walter Watts
Executive Vice President
Radio Corporation of America

Frank W. Wozencraft
Attorney
Legal Counsel, AFCEA

1962

George W. Bailey
Executive Secretary
The Institute of Radio Engineers

Theodore L. Bartlett
Manager, Space Aviation Projects
Defense Electronics, RCA

Major General Gordon A. Blake, USAF
Commander
USAF Security Service

Ben S. Gilmer
President
Southern Bell Tel & Tel Co.

Joseph E. Heinrich
Staff Supervisor, Long Lines Dept.
American Tel & Tel Co.

John R. Howland
Sales Manager
Closed Circuit Division
Philco Corp. G&I Division

Fred E. Moran
Superintendent
Western Union Telegraph Co.

Donald C. Power
Chairman of the Board
General Telephone & Electronics Corp.

1963

Leonard D. Callahan
Vice President
Gilfillan Bros., Inc.

Brigadier General A. F. Cassevant, USA
Commanding General
Fort Monmouth, N. J.

Walter C. Hasselhorn
President
Cook Electric Co.

Walter P. Marshall
President
Western Union Telegraph Co.

Henry J. McDonald
Secretary & General Counsel
Kellogg Switchboard & Supply Co.

A. L. Pachynski
Director of Program Planning
Lenkurt Electric Co.

William L. Roberts
Special Project Liaison Engineer
Ramo-Wooldridge Div.
Thompson Ramo Wooldridge Inc.

Ellery W. Stone
Chairman of the Board
American Cable & Radio Corp.

NEW MEMBERS

Listed below are new members of the AFCEA who have joined the Association during the month of May. Members are listed under the Chapter with which they are affiliated. The June listing will appear in the August issue.

ARIZONA

Paul J. Sturm
James L. Farmer

ATLANTA

Douglas N. Smith
Russell J. Huff
John T. Kerley
Arthur W. Barnes
Harmon L. Greenway
Thomas F. Strickland
Maj. Jerry B. Tullis
John B. Kincaid
William J. Robinson
Albert C. Henning
Clifford L. Causey
William R. Young

AUGUSTA-FORT GORDON

Capt. Albert B. Lewis, Jr.
Lt. John F. Tanner
Louis L. Hattman

BALTIMORE

Lt. Olen E. Naylor, Jr.
J. C. Bankert
V. L. Schad
Charles U. Dayhoff

BOSTON

Wilbur J. Zullo
Charles W. Anderson
Herbert Marsden
George D. Buchanan

CHICAGO

Robert E. Johnsen, Jr.
RAdm. J. A. Briggs
Noel A. Yaney
Keith H. Johnson
James J. Masterson
Lt. Col. Carl E. Trexler
Lawrence T. Moore
Henning S. Hermanson
Thomas M. Ross

DECATUR

Marion B. Janes

DETROIT

R. J. Holland
W. J. Kelly
L. R. Brown

FORT MONMOUTH

Harold T. Sher
Wayne W. Evans
James W. Farrell
Charles C. Wolfe
Ivory J. Crewell
Arthur E. Wolfinger
Morton C. Simon
Sidney Katz
Bruce Hendrickson
Milford S. Piwsky
Robert A. Bassell
Frank H. Grebenau
Harold E. Dobrin
Raymond L. Gribben

GULF COAST

S-Sgt. Lawrence A. Stohr
John B. Murdock
Cecilia F. O'Connor
Capt. Dominic V. Delise
M-Sgt. Howard O. Myers

HAWAII

Lt. Cdr. Louis A. Shryack
David B. Young
Lt. Col. William A. Werber
S-Sgt. Robert L. Brooks
Roy R. Bright
Haruo Tao

LEXINGTON

R. Chontrelle Layson
Kenneth M. Gonseth

LONDON

A-2C James R. Flannery
D. E. Burchett
Lt. Robert J. Grissman
Capt. Thomas H. Baker
Maj. William H. Fritz
John A. Sargrove
George A. Marriott
Capt. Emil R. Nyman
John Savage

LOUISIANA

Roy C. Hingle

MONTGOMERY

James W. Thompson
E. C. Proehle

NEW YORK

Leonard T. Donnelly
Uda B. Ross
Sheldon M. Newberger
John F. Cohane
Robert H. Snedaker
Frederick A. Menes
Col. Eugene R. Kulka
Alwyn L. Carty, Jr.
Jerome Friedman
Harold Kaye
Bernard Klibaner
Carmen Auditore
Walter Bieber
William Harnack
Robert P. Colin
George W. Millett
Carl M. Backer
William F. Panzen

NORTH CAROLINA

John F. Holland, Jr.
Lt. Joe H. Daniel

NORTHEASTERN UNIVERSITY

Hubert E. Holley
Bruce W. Jackson
Brian S. Kelly
Charles P. Polizzotti
J. Mowry Rardon
Fuad Isa Saba
James D. Ryan
William D. Allan
Harvey G. Berig
Raymond L. Campbell
David F. Connelly
Melvin B. Cramer, Jr.
Glenn C. Everett
Kurt E. Waring
Martin S. Feerick, Jr.

NORTH TEXAS

K. P. Dowell
W. R. Bailey
R. F. Keener
James F. Carland

NORTHWEST FLORIDA

John M. Fain
Abbott H. Herring
Herman W. Smith

PARIS

J. B. Tricaud
Col. Stello R. Silleni

PHILADELPHIA

J. Edward Bolich
Lt. Col. L. S. Whitby
W. H. Kley

PITTSBURGH

David R. Forshey
Matthew D. Balkovic
L. R. Huggler
T. A. Vantries

ROCKY MOUNTAIN

Maj. Howard W. Beaver

ROME-UTICA

Harold G. Caldine
H. C. Sager
Carl L. Tendler
Lt. Nevin E. Fornwalt
Haven L. Cheney

SAN FRANCISCO

Capt. Charles R. Wood
James M. Tierney
Harold C. Leler

SAN JUAN

Col. James R. Hughes
James McConney
Santos M. Negron
Maurice K. Nelson
Robert L. Williams
Ramon M. Marti
Edward H. Ostrehan
Antonio Montes, Jr.
Jorge F. Velez
P. Guido Vecchiarelli

SANTA BARBARA

Maj. Zane E. Sprague
Arthur L. Witten
William P. Grant
Hugh C. Bream
CWO Archie J. Rhinehart

SCOTT-ST. LOUIS

Maj. John H. Foresman
Mark W. Moreton
Harry B. Latina
CWO Leslie W. Simpson
Les R. Collins
Norbert W. Diveley
Louis E. Dechant, Jr.
Capt. Andy Shultz
Capt. Russel A. Popp

SOUTH CAROLINA

William H. Roberts
CWO Albert J. Seargeant
Capt. Charles E. Turnbull
Capt. Arthur H. Anderson
Maj. Alphonse W. Jaegers
Roy R. Turner

SOUTHERN CALIFORNIA

B. Barquist
Capt. Lloyd V. Spear
Maj. Donald E. Jenkins
Ralph W. Johnson
Roger E. Dickeson

SOUTHERN CONNECTICUT

Fenmore R. Seton

TOKYO

M-Sgt. Gordon R. Johnson

WASHINGTON

Jack A. Zimmerman
Tom C. Haley
William H. Kiblinger
Henry A. Nye, Jr.
Walton T. Ayer
Maj. Wayne H. Wernimont
W. Elmer Pothen
John B. Thompson
Herbert H. Greger

New members without chapter affiliation.

Anthony G. Schifino, Rochester, N. Y.
William H. Gentry, Jr., Camillus, N. Y.
Charles C. Koch, Golden Beach, Florida
Capt. C. Chin, Taiwan, China
Cdr. Allyn B. Ostroski, Norfolk, Va.
Robert W. Kuhl, Quincy, Ill.
Daniel L. Malone, Rockville, Conn.
James J. Woods, Oswego, New York
Capt. Warren Snyder, Milan, Tennessee

AFCEA Group Members

Communications—Electronics—Photography

Listed below are the firms who are group members of the Armed Forces Communications and Electronics Association. By their membership they indicate their readiness for their share in industry's part in national security.

Sustaining Member

Cook Electric Co.—Transferred from Group Member March 18, 1959.

Acme-Danneman Co., Inc.
Adler Electronics, Inc.
Admiral Corp.
Aircraft Radio Corp.
Allied Control Co., Inc.
Allied Radio Corp.
American Cable & Radio Corp.
American Institute of Electrical Engineers
American Machine & Foundry Co.
American Radio Relay League
American Telephone & Telegraph Co.
American Telephone & Telegraph Co., Long Lines Dept.
Amphenol/Borg Electronics Corp.
Anaconda Wire & Cable Co.
Andrew Corp.
Arnold Engineering Co.
Atlas Film Corp.
Atlas Precision Products Co.
Automatic Electric Co.
Automatic Electric Sales Corp.
Automatic Telephone & Electric Co., Ltd.
Autonetics, Division of North American Aviation, Inc.

Barry Controls, Inc.
Beiser Aviation Corp.
Bell & Gossett Co.
Bell Telephone Company of Pa.
Bell Telephone Laboratories, Inc.
Bendix Radio Division, Bendix Aviation Corp.
Bliley Electric Co.
Bomac Laboratories, Inc.
British Thomson-Houston Co., Ltd.
Bruno-New York Industries Corp.
Burroughs Corp.

California Water & Telephone Co.
Cambridge Thermionic Corp.
Capitol Radio Engineering Institute, Inc.
Carolina Telephone & Telegraph Co.
Central Technical Institute
Chesapeake & Potomac Tel. Co.
Cincinnati & Suburban Bell Tel. Co.
Collins Radio Co.
Columbia Broadcasting System, Inc.
Contraves Italiana
Convair, Division of General Dynamics Corp.
Copperweld Steel Co.
Cornell-Dubilier Electric Corp.
A. C. Cossor Ltd.
Craig Systems, Inc.
Crosley Division-Avco Mfg. Corp.

Designers for Industry, Inc.
Diamond State Telephone Co.
Dictaphone Corp.
DuKane Corp.
Du Mont, Allen B., Laboratories, Inc.

Eastman Kodak Co.
Electronic Associates, Inc.
Electronic Communications, Inc.
Elgin Metalformers Corp.

Fairchild Camera & Instrument Corp.

General Analysis Corp.
General Aniline & Film Corp.
General Communication Co.
General Electric Co.
General Electric Co., Defense Systems Dept.
General Telephone Corp.
Gilfillan Bros., Co.
Globe Wireless, Ltd.
Gray Manufacturing Co.

Hallamore Electronics Co.
Haller, Raymond and Brown, Inc.
Hallicrafters Co., The
Haloid Xerox Inc.
Hazeltine Electronics Division, Hazeltine Corp.
Heinemann Electric Co.
Hoffman Laboratories, Inc.
Hogan Laboratories, Inc.
William F. Hogan Associates, Inc.
Hughes Aircraft Co.

Illinois Bell Telephone Co.
Indiana Bell Telephone Co.
Indiana Steel & Wire Co.
Institute of Radio Engineers
Instruments for Industry, Inc.
International Business Machines
International Resistance Co.
International Telephone & Telegraph Corp.
International Telephone & Telegraph Laboratories
ITT Federal Division of International Telephone & Telegraph Corp.

Jacobsen Manufacturing Co.
Jansky & Bailey, Inc.
Jerrold Electronics Corp.

Kellogg Switchboard & Supply Co.
Kleinschmidt Laboratories, Inc.

Leich Sales Corp.
Lenkurt Electric Co.
Lewyt Manufacturing Corp.
Litton Industries, Inc.
Lockheed Aircraft Service, Inc.

Machlett Laboratories, Inc.
Magnavox Co.
Marconi's Wireless Telegraph Co. Ltd.
Materiel Telephonique Co.
Michigan Bell Telephone Co.
Montgomery Co., The
Motorola Inc.
Mountain States Telephone & Telegraph Co.
Mullard Ltd.
Muter Co.

National Co., Inc.
Nelson Technical Enterprises, Inc.
Nems-Clarke Co., Div. of Vitro Corp. of America
New England Tel. & Tel. Co.
New Jersey Bell Telephone Co.
New York Telephone Co.
North Electric Co.
Northwestern Bell Telephone Co.

Oak Manufacturing Co.
Ohio Bell Telephone Co.
O'Keefe & Merritt Co.

Pacific Mercury Television Mfg. Corp.
Pacific Telephone & Telegraph Co.
Packard-Bell Electronics Corp.
Page Communications Engineers, Inc.
Phelps Dodge Copper Products Corp.
Philco Corp.
Photographic Society of America
Plessey Co., Ltd.
Prodelin Inc.

Radiation, Inc.
Radio Corporation of America
Radio Corporation of America, Astro-Electronic Products Div.
Radio Corporation of America, Defense Electronic Products
RCA Great Britain, Ltd.
Radio Engineering Laboratories, Inc.
Radio Frequency Laboratories, Inc.
Ramo-Wooldridge, Division of Thompson Ramo Wooldridge Inc.
Raytheon Co.
Red Bank Division, Bendix Aviation Corp.
Reeves Instrument Corp.
Rocke International Corp.

Saxonburg Ceramics, Inc.
Scanner Corporation of America, Inc.
Singer Manufacturing Co., The Military Products Division
Smith-Corona Marchant Inc., Research and Development Division
Society of Motion Picture & Television Engineers
SoundScriber Corp., The
Southern Bell Telephone & Telegraph Co.
Southern New England Telephone Co.
Southwestern Bell Telephone Co.
Sperry Gyroscope Co., Division of Sperry Rand Corp.
Sprague Electric Co.
Stackpole Carbon Co.
Standard Telephones & Cables, Ltd.
Stanford Research Institute
Stewart-Warner Corp.
Stoddart Aircraft Radio Co.
Stromberg-Carlson Co., Division of General Dynamics Corp.
Surprenant Mfg. Co.
Sylvania Electric Products, Inc.

Technical Materiel Corp., The
Tele-Dynamics, Inc.
Telephonics Corp.
Teleprinter Corp.
Teletype Corp.
Texas Instruments, Incorporated
Times Facsimile Corp.
T.M.C. (Canada) Ltd.
Transitron Electronic Corp.
Trans-Sonics, Inc.
Tung-Sol Electric, Inc.

Union Carbide Corp.
United Telephone Co.
United Transformer Co.

Van Norman Industries, Inc., Electronics Division
Varian Associates

Waterman Products Co., Inc.
Webcor, Inc., Government Division
West Coast Telephone Co.
Western Electric Co., Inc.
Western Union Telegraph Co.
Westinghouse Electric Corp.
Weston Electrical Instrument Corp.
Wheelock Signals, Inc.
Wilcox Electric Co., Inc.
Willard Storage Battery Div., Electric Storage Battery Co.
Wisconsin Telephone Co.
Wollensak Optical Co.

Zenith Radio Corp.

AFCEA CHAPTERS AND CHAPTER OFFICERS

REGIONAL VICE PRESIDENTS

Region A: G. D. Montgomery, AT&T Co., 32 Ave. of the Americas, New York, N. Y. ***New England States, New York, New Jersey.***

Region B1: George C. Ruehl, Jr., 2118 St. Paul St., Baltimore Md. ***Delaware, District of Columbia, Maryland, Eastern Pennsylvania and Virginia.***

Region B2: Paul H. Clark, Radio Corporation of America, 224 N. Wilkinson St., Dayton, Ohio. ***Kentucky, Ohio, West Virginia and Western Pennsylvania.***

Region C: W. K. Mosley, Southern Bell T&T Co., Hurt Bldg., Atlanta, Ga. ***Southeastern States along Atlantic and Gulf coasts—from North Carolina to Louisiana including Tennessee.***

Region D: Maj. Gen. Harry Reichelderfer, USA (Ret.), Southwest Research Institute, 8500 Culebra Rd., San Antonio, Tex. **New Mexico, Texas, Oklahoma, Arkansas.**

Region E: Walter H. Pagenkopf, Teletype Corp., 5555 Touhy Ave., Skokie, Ill. ***Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota, South Dakota, Wyoming, Colorado.***

Region F: Ray E. Meyers, 717 Anderson Way, San Gabriel, Calif. ***Arizona, Utah, Nevada, California, Idaho, Oregon, Montana and Washington.***

CHAPTERS: PRESIDENTS AND SECRETARIES

ARIZONA: Pres.—Lt. Col. Wm. M. Coeyman, 4015A Grierson, Ft. Huachuca, Ariz. Sec.—Samuel M. Dyer, P.O. Box 2758, Ft. Huachuca.

ATLANTA: Pres.—A. E. Arnold, Western Union, 48 Marietta St., N.W., Atlanta, Ga. Sec.—A. M. Wilson, Southern Bell T&T Co., 51 Ivy Street, N.E.

AUGUSTA-FORT GORDON: Pres. — Col. Robert R. Creighton, Hq. USA SESCS, Ft. Gordon, Ga. Sec.—Lt. Col. Ollie J. Allen, USASTC, Ft. Gordon.

BALTIMORE: Pres.—J. Walter Colvin, Bendix Radio Div., Towson, Md. Sec.—Ray Moore, Hoover Electronics Co., Timonium, Md.

BOSTON: Pres. — Col. Sidney S. Davis, PMST, Northeastern University, Boston, Mass. Sec. — William Melanson, Cambridge Thermionics Corp., 447 Concord Ave., Cambridge.

CENTRAL FLORIDA: Sec.—Russell R. Randell, 208 So. Manhattan Ave., Tampa, Fla.

CHICAGO: Pres.—Henry J. McDonald, Kellogg Switchboard & Supply Co., 6650 S. Cicero Ave., Chicago 38. Sec.—William L. McGuire, Automatic Electric Co., Northlake, Ill.

DAYTON-WRIGHT: Pres. — William H. Shade, General Mills, Inc., 2600 Far Hills Bldg., Dayton. Sec.—Cecil Hill, General Electric Co., 333 W. 1st St., Dayton.

DECATUR: Pres.—Lt. Col. Robert A. Starr, Decatur Signal Depot, Decatur, Ill. Sec.—Edward J. Maloney, 60 Northland Dr., Decatur, Ill.

FORT MONMOUTH: Pres.—Norman K. Freeman, 84 Bay Ave., Atlantic Highlands, N. J. Sec.—Harry C. Ross, Box 249, Hillside Rd., Atlantic Highlands, N. J.

FRANKFURT: Pres.—Col. W. L. Martin, SigO, Hq. V Corps, APO 79, N. Y.

GULF COAST: Pres.—Lt. Col. Everett G. Reed, Keesler Tech. Trng Cntr, Keesler AFB, Miss. Sec.—Donald H. Presley, Southern Bell T&T Co., Gulfport.

GREATER DETROIT: Pres.—Maj. Carl L. Lisbeth, C&E Staff, Hq. 30th Air Div., Belleville, Mich. Sec.—J. R. Saxton, Michigan Bell Telephone Co., 305 Michigan Ave., Detroit.

HAWAII: Pres.—Capt. Joseph F. Dalton, US Naval Communications Station, FPO 128, S. F. Sec.—Lt. Donald M. Keith, US ACAN Station, Hawaii, APO 958, S. F.

KANSAS CITY: Pres.—William E. Fisher, SW Bell Tel Co., 324 E. 11th St., Kansas City, Mo. Sec.—Charles E. Sevier, SW Bell Tel Co., 324 E. 11th St., Kansas City.

KOREAN: Sec.—William L. Wardell, OEC, RD-CD, APO 301, S. F.

LEXINGTON: Pres.—Raymond Soard, Jr., General Tel. Co., 151 Walnut St., Lexington, Ky. Sec.—Waddy Neubauer, 201 Romany Rd., Lexington, Ky.

LONDON: Pres.—Capt. Henry Williams, Jr., CINCNELM, Navy 100, Box 6, FPO N. Y. Sec.—Capt. H. W. Gipple, Hq. Third AF, APO 125, N. Y.

LOUISIANA: Pres.—William A. Gillentine, Southern Bell T&T Co., 3300 Gravier St., New Orleans, La. Sec.—A. Bruce Hay, Southern Bell Tel. & Tel. Co., 520 Baronne St., New Orleans.

MONTGOMERY: Pres.—Lt. Col. Herbert Herman, Air Command & Staff College, Maxwell AFB, Ala. Sec.—Luther L. Hall, 703 Belvedere Drive, Montgomery, Ala.

NEW YORK: Pres.—Henry R. Bang, New York Telephone Co., 140 West St., New York 7, N. Y. Sec.—Thomas Brown IV, New York Telephone Co., Rm. 2011, 140 West St., New York 7, N. Y.

NORTH CAROLINA: Pres.—Col. Ray Bagley, 1st Log. Cmd, Fort Bragg, N. C. Sec.—John C. Coley, Carolina T&T Co., 517 Hay St., Fayetteville.

NORTH TEXAS: Pres.—Thomas F. Byrnes, AT&T Co., 212 No. St. Paul St., Dallas. Sec.—Robert J. Novak, AT&T Co., 212 No. St. Paul St., Dallas.

NORTHEASTERN UNIVERSITY: 360 Huntington Ave., Boston 15, Mass. Div. A: Pres.—Richard Dwyer; Div. B: Pres.—Harry Giberson.

NORTHWEST FLORIDA: Pres.—Sam Love, Jr., Southern Bell T&T Co., Pensacola, Fla. Sec.—Lt. Col. Leroy T. Souders, P. O. Box 302, Shalimar, Fla.

ORANGE: Pres.—Lewis A. Brown, Southern Bell T&T, 45 N. Main St., Orlando, Fla. Sec.—Donald E. Murphy, Southern Bell T&T, 45 N. Main St., Orlando.

PARIS: Pres.—Maj. Gen. Victor Conrad, SigDiv, SHAPE, APO 55, New York. Sec.—Lt. Col. Russell A. Duke, Office of U.S. Army Attache, APO 230, N. Y.

PHILADELPHIA: Pres. — Frank D. Langstroth, Philco Corp., 4700 Wissahickon Ave., Philadelphia, Pa. Sec. — Conrad Young, Philco Corp., 4700 Wissahickon Ave., Philadelphia.

PHILIPPINE: Pres.—Lt. Col. Sidney A. Goldman, 1961st AACS Sqdn, APO 74, S. F. Sec.—Capt. Roy L. Stover, 1961st AACS Sqdn, APO 74, S. F.

PITTSBURGH: Pres. — Robert C. Ridley, Copperweld Steel Co., Glassport, Pa. Sec.—H. W. Shepard, Jr., 625 Stanwix St., Pgh.

ROCKY MOUNTAIN: Pres.—Col. Howard S. Gee, Hqs. ADC, Ent AFB, Colo. Sec.—Lt. Col. Michael E. Wardell, Hqs NORAD, Ent AFB, Colo.

ROME-UTICA: Pres.—William L. Roberts, 102 Fort Stanwix Park North, Rome, N. Y. Sec.—A. D. Reisenberg, Box 107, Griffiss AFB, N. Y.

SACRAMENTO: Sec.—Capt. Robert McMorrow, 951 La Sierra Drive.

SAN DIEGO: Pres.—Cmdr. Samuel Freedman, Chemalloy Electronics Corp., Gillespie Airport, Santee, Calif.

SAN FRANCISCO: Pres.—J. T. Chatterton, Mackay Radio & Tel. Co., 350 Mission St., San Francisco, Cal. Sec.—Carroll V. N. Steffen, Pacific T&T Co., 74 New Montgomery St., S. F.

SAN JUAN: Pres.—Cdr. Harry C. Rodin, USN, 10th Naval District, U. S. Naval Sta., San Juan, P. R. Sec.—Albert R. Crumley, Standard Elec. Corp. of P. R., Box 11156 F. Juncos St., Santurce, P. R.

SANTA BARBARA: Pres.—RAdm. Clarence C. Ray, 63 Manzanita Lane, Star Route, Santa Barbara, Cal. Sec.—Walter W. Montgomery, Raytheon Co., P. O. Box 636, Santa Barbara.

SCOTT-ST. LOUIS: Pres.—Col. George A. Zahn, Hq. AACS, DCS/COMM, Scott AFB, Ill. Sec. — Allan L. Eisenmayer, P.O. Box 456, Trenton, Ill.

SEATTLE: Pres.—Lee David, 4609 W. Oregon St., Seattle, Wash. Sec. — J. Alan Duncan, 6836 - 29th Ave., N.E., Seattle.

SOUTH CAROLINA: Pres.—E. D. Biggerstaff, Jr., Charleston Naval Shipyards, Charleston, S. C. Sec.—Donald D. Harris, Southern Bell T&T Co., Owen Bldg., Columbia, S. C.

SOUTH TEXAS: Pres.—Maj. Gen. Harry Reichelderfer, Southwest Research Inst., 8500 Culebra Rd., San Antonio. Sec.—John D. Rainbolt, Southwestern Bell Tel. Co., 301 Broadway, San Antonio.

SOUTHERN CALIFORNIA: Pres. — John W. Inwood, Western Union, 745 So. Flower St., Los Angeles. Sec.—David G. Soergel, North American Aviation, Inc., 9150 E. Imperial Hwy, Downey, Cal.

SOUTHERN CONNECTICUT: Pres.—John N. Higgins, KIP Electronics Corp., 29 Holly Pl., Stamford, Conn. Sec.—J. A. Leopold, Dictaphone Corp., 375 Howard Ave., Bridgeport.

SWITZERLAND: Pres.—Capt. Gerald C. Gross, USNR, Intl. Telecommunications Union, Geneva. Sec.—Robert V. Lindsey, Intl. Telecommunications Union, Geneva.

TINKER-OKLAHOMA CITY: Pres.—Lt. Col. George L. Timme, Jr., GEEIA Rgn., Tinker AFB, Okla. Sec.—Maj. John L. Whyatt, 3rd AACS Sqdn. (Mob), Tinker AFB.

TOKYO: Pres.—Capt. Frank A. Dingfelder, Staff, Cdr. Naval Forces Japan, FPO S. F., Cal. Sec.—Cdr. Harold B. Kirkham, Naval Comm. Facility, Navy 830, Box 20, FPO, S. F.

WASHINGTON: Pres.—A. W. Christopher, Sylvania Electric, 734 15th St., N.W., Washington, D. C. Sec.—H. R. Hartsough, AT&T Co., 1001 Connecticut Ave., N.W., Washington, D. C.

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Chapter News

Atlanta

The final meeting of the season was held on May 26th at the Ft. McPherson Officers Club with 138 members and guests present.

R. J. Smith, one of the founders of the Atlanta Chapter and a faithful worker for the chapter throughout the years, was presented an AFCEA life membership by W. K. Mosley.

The following new officers were elected for the 1959-60 term: president—A. E. Arnold, District Manager of the Western Union Telegraph Co.; vice presidents—Lt. Col. Thomas A. Pugh, Lt. Col. Luther J. Ross, Garland Sweeney and Henry J. McKinley.

Entertainment for the evening was presented by a group from the Third U. S. Army band.

Augusta-Fort Gordon

Following a social hour and buffet supper, John V. Viciguerra, Assistant Manager for Administration at the Savannah River Operation Office, spoke on "The Atom in the Service of Humanity." During the meeting, a film was shown on the United States' exhibit at the Fifth International Electronic and Nuclear Exposition and Congress held in Rome, Italy, June 1958. Mr. Viciguerra's exhibit at the Exposition was awarded the prize cup for the best pavilion for the United States.

Baltimore

The Western Electric Co., 2500 Broening Highway, Baltimore, hosted the chapter's May 26th dinner-meeting which was held at its plant. Thomas N. Pook, Superintendent of Systems Testing in Western Electric's Air Defense Electronics Services (ADES) Project, of New York, presented an outstanding talk and also exhibited a new film entitled "SAGE In Your Defense."

After dinner, chapter members and guests were given a tour of Western Electric's modern plant which is the largest polyethylene insulated telephone cable plant in the world.

Boston

The chapter's May meeting was held at the Boston Naval Officers Club. Col. Sidney S. Davis, Professor of Military Science and Tactics, Northeastern University, was installed as the new chapter president.

Guest speaker was William T. Alexander, Dean of Northeastern's College of Engineering. Dean Alexander, who recently returned from touring the campuses of numerous engineering colleges in Russia with American educators, addressed the group on "Facts on Engineering Education in Russia."

Chicago—Brig. Gen. Earle F. Cook, far left, Acting Deputy Chief Signal Officer, was principal speaker at the May 21st meeting. Others shown, from left to right, are Dr. Edward E. Kleinschmidt of Kleinschmidt Laboratories, Inc., host to the chapter; David S. McNally, vice president of Kleinschmidt; and Henry J. McDonald, chapter president.

Chicago

Kleinschmidt Laboratories, Inc., was host to the chapter's May 21st meeting held at the Tam-O-Shanter Country Club.

Brig. Gen. Earl F. Cook, Acting Deputy Chief Signal Officer, was guest speaker. General Cook gave an illustrated talk on "The New Era of Space Communications" in which he described present and future communications and electronics developments of the Army Signal Corps.

Dayton-Wright

The newly elected chapter officers are: president—William H. Shade, Assistant Regional Manager, mid central region, General Mills Mechanical Division; executive vice president — Col. William H. Congdon; secretary-treasurer—Cecil Hill; vice presidents—Lt. Col. David Anderson, Neal Breesman, Col. Edward McKaba, J. D. Temoyan, Lt. Col. J. H. Terrell, Jr. and Richard Turner.

Boston—Robert B. Richmond, retiring chapter president, presents the chapter charter to Col. Sidney S. Davis, PMST at Northeastern University, the newly elected president for 1959-60.

Decatur

The chapter's May 26th meeting was held at the Decatur Signal Depot Officers Mess. The agenda for evening's program included a lecture on "Ham" Radio and a tour and demonstration of the Depot's "Ham" Station.

Fort Monmouth

Norman K. Freeman of the Stromberg-Carlson Co. was elected president of the Fort Monmouth chapter at the May 21st meeting held at Gibbs Hall Officers Club. He succeeds Col. A. L. Burke of the U. S. Army Signal School. Other officers elected were: 1st vice president—Col. Robert P. Haffa, Signal School; 2nd vice president—Col. Murray A. Little, Armed Services Electro Standards Agency; secretary—Harry C. Ross, Atlantic Highlands, Signal Equipment Support Agency, and treasurer—Thomas Schlitz, Hillside, Army Signal School. The next meeting will be held in September.

Gulf Coast

The May 4th meeting was held at the White House Hotel in Biloxi, Miss., and new officers were elected. Lt. Col. Everett G. Reed, Deputy School Commander, Ground Electronics Dept., Keesler Technical Training Center, is the new chapter president. Vice president is Lt. Col. Paul C. Kiefer, Deputy School Commander, Officers Communication and Electronics Dept., Keesler Technical Training Center. Secretary and treasurer respectively are Donald H. Presley, Manager, Southern Bell Tel. & Tel. Co., Gulfport, Miss. and Mrs. Cora U. Billman, Instructor, Airborne Electronics Dept., Keesler Air Force Base, Miss.

Following the business meeting Lt. Cora McDonald, Training Officer and Lt. Odes Robinson, Communications Officer of the Civil Air Patrol, presented talks entitled "Operation and Communications in the Civil Air Patrol."

Fort Monmouth—Shown following the annual election of officers on May 21st are, left to right: J. P. Hoffman, PIO, Fort Monmouth, chairman of the nominating committee; Col. Murray A. Little, Armed Services Electro Standards Agency, second vice president; Norman K. Freeman of Stromberg-Carlson, president; Harry C. Ross, Signal Equipment Support Agency, secretary; and Thomas R. Schlitz, treasurer.

Kansas City

The President Hotel was the setting for the May 28th dinner-meeting. Dr. Kraft Ehricke, Chief Scientist for the Convair Corp., was the principal speaker for the evening in a joint meeting with the "First Annual North American Air Defense (NORAD) sponsored Electronics Counter Countermeasure Meeting." He talked most interestingly about the use of satelloids and satellites as the key in electronic counter countermeasures, and the necessity of *manned* satellites for adequate defense.

Prior to the speech, a business meeting was held and the following were elected to their offices for the ensuing year: president—W. E. Fisher, Southwestern Bell Tel. Co.; vice presidents—Col. L. C. Heartz, USAF, R. R. Van Sant, Wilcox Electric Co., W. J. London, Southwestern Bell Tel. Co.; secretary-treasurer—C. E. Sevier, Southwestern Bell Tel. Co.; directors—Lt. Col. Geo. R. McGee, USAF, Miss Ethel Klusman, USAF, Lt. Col. G. D. Meserve, USAF (Ret.), Lt. Col. Z. D. Barnes, USAF, C. L. Buell, Western Union Co., J. T. Wallingford, Central Tech. Inst., Elvin Durr, United Tel. Co., W. R. Wheeler and L. E. Eastmond, both of A.T.&T. Co.

Eighty-nine members and guests were present at the meeting.

London

Rear Adm. Frederick R. Furth, USN (Ret.), past president of AFCEA, was the featured speaker at the April 9th meeting of the chapter held at the Columbia Club Hotel. Admiral Furth discussed the AFCEA on a world-wide, international basis, chapter activities, the 1959 National Convention and general plans of AFCEA for the coming year.

Louisiana

At the April 28th meeting, C. C. "Bud" Walther, past president of the chapter, told of his recent trip around the world in a talk called *Operations Enterprise.*

New York

Henry Loomis, Director of Broadcasting Service for the Voice of America, was the guest speaker at the chapter's April 29th meeting that was held at Belmont Plaza Hotel. Mr. Loomis presented a very complete picture of the objectives, activities and problems of the Voice of America. Following Mr. Loomis' excellent presentation, there was a question and answer period.

Seated at the head table were: chapter president Henry R. Bang, Adm. Tucker, Gen. Corderman, Col. Jennings, Col. Engler, Capt. Powers, USN, and Glenn Montgomery.

North Texas

The May 22nd dinner-meeting of the chapter was held at the Italian Village Restaurant in Dallas. At the meeting the proposed schedule for the coming year was reviewed and the annual election of officers was held. The following were elected: president — Thomas F. Byrnes, AT&T; vice president—R. T. Shiels, Anaconda Wire and Cable Co., and secretary-treasurer—Robert J. Novak, AT&T.

Northwest Florida

On February 24th, the chapter joined with the local section of the IRE to hold a dinner and social meeting. Guest speaker for the meeting was Dr. Ernst Weber, 1959 president of IRE.

The election of officers took place at the March 26th meeting. Elected were: president—Sam Love, Jr., Southern Bell T&T Co.; 1st vice president—Maj. Ray K. Kinslow, USAF; 2nd vice president—William F. Wagner, Westinghouse Electric Corp., and secretary-treasurer—Lt. Col. LeRoy T. Souders, USAF (Ret.). The installation of officers was conducted on April 24th.

Orange

Recently, a series of panel discussions were held by the Orange chapter to stimulate interest in and promote exchange of ideas among technical and professional men concerning the solution to the problem of mid-air collisions.

Among the panelists were Dr. James Q. Brantley, Director of Research Division, Radiation Inc.; Mr. W. E. McLean, Director of Aviation, City of Orlando; Mr. W. A. Smith, Chief of Ground Control, Orlando Office of CAA.; Lt. Col. Leslie Gaskins, USAF, SAC Operations Officer, McCoy Air Force Base, Lt. Gen. W. E. Kepner, USAF (Ret.) was the moderator of one panel, and Col. George M. Smith, USAF (Ret.) moderated another.

Many technical phases of the problem of mid-air collision and diverse methods of electronic control and warning systems were discussed at length. Also included were comments as to the possible re-design of aircraft with a view to better pilot visibility and more positive methods of detection of other aircraft in a given area.

Pittsburgh

Col. George P. Sampson, Chief, Army Communications Service, was the guest speaker at the May 14th meeting which was held at Carnegie Institute of Technology. The subject of Col. Sampson's talk was *Evolution of Military Communications.*

Beginning in the earliest days of military communications, Col. Sampson described the smoke signals of 1850, showed the relationship of communications to other military sciences, and traced communications applications through the Civil War, the Spanish-American War, World Wars I and II and the Korean War. He then discussed the future of communications and what the military intends to do about it.

London—Rear Adm. F. R. Furth, USN(Ret.), then National President of the AFCEA, addressed the April 9th meeting. Chapter officers pictured with their guest speaker are, left to right: H. G. A. Kay, Benjamin Electric Co., Ltd., associate vice president; Capt. Henry Williams, Jr., USN, president; Admiral Furth; Capt. Harvey W. Gipple, USAF, secretary; Lt. Col. R. F. Amann, treasurer; L. T. Hinton, Standard Telephone & Cables, Ltd., associate secretary; and Maj. C. L. Bachtel, USA, vice president.

New York—Pictured during the social hour which preceded the chapter's April 29th meeting are, left to right: Col. W. E. Jennings, Signal Officer, First Army; Henry Loomis, Director of Broadcasting Service for the Voice of America, featured speaker; Chapter President Henry R. Bang of New York Telephone Co.; Capt. E. C. Powers, U. S. Naval Shipyard, Brooklyn; and Rear Adm. S. M. Tucker, Asst. Director, Brookhaven National Laboratory.

Rocky Mountain

The April meeting was held at the U.S. Air Force Academy and approximately 190 members and guests from Mountain States Telephone and Telegraph Company (Denver and Colorado Springs), U.S. Air Force Academy, Fort Carson, North American Air Defense Command, USAF Air Defense Command and US Army Air Defense Command attended.

San Francisco

Mare Island Navy Yard was host to the chapter on the evening of May 21. Tours of the shipbuilding and repair facilities were conducted. Chapter members had the opportunity to see several new submarines in various stages of construction: the *Halibut*, the *Theodore Roosevelt* and the *Scamp* among others. One of the tour highlights was the inspection of a wooden full scale mock-up of a new design for a nuclear powered submarine.

After the tour, the members attended a dinner at the Mare Island Commissioned Officers Mess. During the dinner-meeting, Lt. Commander Wilkinson gave a talk on nuclear power reactors for propulsion of submarines. His talk was illustrated with slides and pointed up the importance of nuclear submarines with missile firing capabilities to our country's defense.

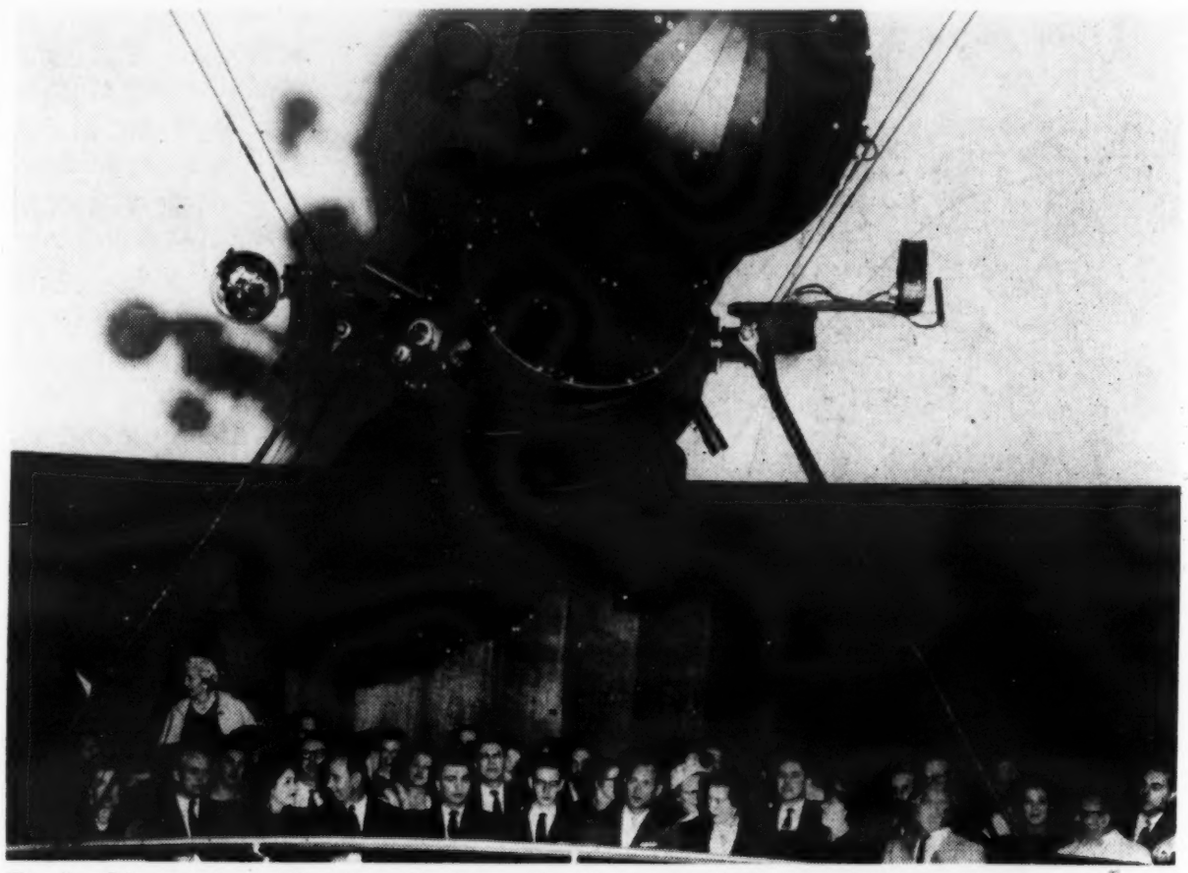
95 Chapter members and guests attended.

San Juan

Cmdr. Harry C. Rodin, Industrial Mgr., 10th Naval District, U.S. Naval Station, was elected president of the chapter at the dinner-meeting held at the Officers Club, Fort Brooke, May 28. Cmdr. Rodin was the 1957-58 president of the South Carolina Chapter.

Other officers for the coming year are: 1st vice president—Col. James R. Hughes, USA (Ret.), Radio Corp. of Puerto Rico; 2nd vice president—Clyde E. Dickey, Puerto Rico Telephone Co., 3rd vice president—Kenneth M. Barbier, Radio Corp. of Puerto Rico; secretary—Albert R. Crumley, Jr., Crumley Radio Corp., and treasurer—Jorge N. Toledo, Radio Corp. of Puerto Rico.

Directors are: James P. Fitzwilliam, U.S. Army Signal Corps; Eugene W. Klein, Federal Communications Commission; George Alich, FAA Communications; Ralph Quainton, Naval Radio Station (T), and Juan R. Castanera, Radio Corp. of Puerto Rico.



Rocky Mountain—The U. S. Air Force Academy was the scene of the chapter's April meeting. Shown above are some of the AFCEA members and guests during a visit to the Academy's Planetarium.

Santa Barbara

The mission of the AFCEA and the important role of the local chapter in fostering the cooperation between the Armed Forces and industry in its area were discussed by Rear Adm. Charles F. Horne, USN(Ret.), Vice President for Research, Convair Division, General Dynamics Corporation, Pomona, and a National Director of the AFCEA, in an address before the first dinner-meeting of the new Santa Barbara Chapter on May 8th.

Rear Adm. Clarence C. Ray, USN (Ret.), chapter president, introduced the other distinguished guests who included: Floyd Robinett, Mayor of Santa Barbara, who welcomed this newest activity in Santa Barbara; Ray E. Meyers of Lockheed, AFCEA Regional Vice President; National AFCEA Vice President John W. Inwood, Western Union, who is also president of AFCEA's Southern California Chapter at Los Angeles; National Director Harry E. Austin, RAC, San Francisco; and Capt. W. B. Goulett, AFCEA Executive Vice President, who presented the official chapter charter and installed the new officers.

The following were named to the board of directors of the chapter: Adm. Stuart S. Murray, USN(Ret.), Rand Co., Santa Monica and AVCO, Santa Barbara; Ralph F. Redemske, vice president of Servomechanisms, Santa Barbara; and Dr. Joseph J. Sayovitz who is head of the Department of Electronics at the University of California at Santa Barbara.

Santa Barbara—The first dinner-meeting of AFCEA's newest chapter took place on May 8th. Honor guests and chapter officers at the head table were, left to right: W. B. Goulett, then AFCEA Executive Vice President, who presented the official chapter charter; Floyd Bennett, Mayor of Santa Barbara; RAdm. Charles F. Horne of Convair and National Director of AFCEA, who delivered the main address; Ray Meyers of Lockheed Aircraft, Regional Vice President; John W. Inwood, National Vice President and Southern California Chapter President; Harry E. Austin of RCAC, National Director; and the following chapter officers: Roger A. Moe, Santa Barbara Research Center, treasurer; Walter W. Montgomery, Raytheon Mfg. Co., secretary; Maj. Richard R. Luce, Vandenberg AFB, 2nd vice president; Lt. Col. H. H. Dillard, USA (Ret.), 1st vice president; and RAdm. Clarence C. Ray, USN (Ret.), president.

(*Continued from page* 50)

Other chapter officers are: Lt. Col. Holman H. Dillard, USAR (Ret.), first vice president; Maj. Richard R. Luce, USAF, Vandenberg AFB, second vice president; Walter W. Montgomery, Raytheon Manufacturing Co., secretary; and Roger A. Moe, Santa Barbara Research Center, treasurer.

National Headquarters extends its congratulations to the new chapter with the feeling of assurance that under the able leadership of Admiral Ray, it will develop into a strong and effective unit of the Association.

Scott-St. Louis

The May 1st dinner-meeting of the chapter was held at Augustine's Restaurant, Belleville, Ill. at which 80 members and guests were present. After the business was conducted, there was a report of the presentation of AFCEA/ROTC awards by Gen. Doubleday, AFROTC at St. Louis University, AROTC and AFROTC at Washington University and AROTC and AFROTC at Missouri University.

The main event of the evening was the presentation by Captain William R. Chaires, U.S. Army Signal Corps, Commander, U.S. Army Signal Avionics Liaison Office, St. Louis, Mo., of *The U.S. Army Signal Avionics Program.* Introduced by Col. George A. Zahn, Capt. Chaires gave a most interesting and informative word picture of the program, illustrated with the use of a static display of aircraft used by the Army in accomplishing its mission.

South Texas

The chapter's May 5th meeting was held at the Randolph Air Force Base Officers Club. Robert H. Haack, Supervisor of the Photographic Unit at Southwest Research Institute, gave an interesting talk, illustrated with slides. Mr. Haack is a specialist on research and industrial photography, color documentation, high speed cinematography and photomicrography.

Southern California

A selected number of delegates from 97 countries attending the State Department sponsored plenary session of the CCIR (International Consultative Committee on Radio) were the guests of the chapter at the April dinner-meeting.

The Honorable Herbert Hoover, Jr., consultant to the State Department extended a welcome to these guests and introduced Dr, Henry Richter, scientist in the Jet Propulsion Labs. and a technical advisor to the DOD Advance Research Projects Agency on a worldwide satellite and space vehicle tracking net. Dr. Richter spoke on "Space Communications."

Long range plans are now being formulated for the expansion of a world-wide chain of space tracking stations, Dr. Richter said. He also pointed out that the additional overseas tracking stations planned by APRA and the National Aeronautics and Space Administration will allow space scientists to follow satellite and space vehicles launchings in four types of orbit.

South Texas—Robert H. Haack, far left, Supervisor of the Photographic Unit at Southwest Research Institute, was guest speaker at the May 5th meeting. Others from left to right are: Maj. Gen. Harry Reichelderfer, USA(Ret.), Assistant Director, Southwest Research Institute, president of the chapter and also Regional Vice President; Cadet Robert L. Orr, who was presented an AFCEA gold medal at the meeting as the outstanding AFROTC cadet majoring in Electrical Engineering at the University of Texas; and Capt. Harold L. Harris, Dept. of Air Science, University of Texas.

Tinker-Oklahoma City

The Tinker-Oklahoma City held its May meeting at the Federal Aviation Agency. The program for the meeting was presented by FAA officials who outlined the over-all responsibilities and general history of the Agency. The program concluded with a movie showing operation problems associated with Air Traffic Control in the United States.

The following officers of the chapter were elected at the meeting: president—Lt. Col. G. L. Timme, Jr., Tinker AFB; first vice president—Lt. Col. R. E. Davis, Midwest City; second vice president—E. H. Gilmore, RCA Field Engineer, Tinker AFB; third vice president — R. E. Howard, Jr., Oklahoma City; fourth vice president—C. H. Nesbitt, Western Union Telegraph Co.; secretary—Maj. J. L. Whyatt, Tinker AFB; and treasurer—Lt. Col. E. K. Porterfield, Midwest City.

The following men were named to serve as the Board of Directors: D. F. Cravens, Southwestern Bell Telephone Co.; H. E. Dooley, Southwestern Bell Telephone Co.; L. G. Dorsett, Dorsett Labs, Inc.; J. R. Ellison; Col. A. E. Key, (USAF) Tinker AFB; W. A. Kitchen, Oklahoma Gas and Electric Co.; F. J. Rohrer, Western Union Telegraph Co.; L. A. Trautman; Maj. F. S. Villines; M. M. Williams, Southwestern Bell Telephone Co.

Washington

Captain David R. Hull, USN, (Ret.), President of Electronic Industries Association and Vice President of Raytheon Manufacturing Company, was the speaker at the May meeting of the chapter. His subject was "How Vital Are Electronics and Communications

(*Continued on page* 64)

NEWS ITEMS AND NEW PRODUCTS

"Mercury," the Nation's First manned satellite, will be equipped with Avion radar beacons for precision tracking.

This announcement, made by Avion division of ACF Industries, Incorporated, followed the awarding of a $434,805 contract to produce the transistorized electronic devices for the Project Mercury capsule, the National Aeronautics and Space Administration's manned orbital space flight vehicle. The contract was awarded by Collins Radio Company, developer of the capsule communications system for McDonnell Aircraft Corporation.

Two types of beacons will be used, according to Avion; both will be installed in the satellite itself, described by NASA as a one-ton blunted capsule. It will be fired into a nearly circular orbit at an altitude of roughly 100 to 150 miles, to permit a 24-hour lifetime.

An Avion company spokesman said both beacons will be used in the precision tracking of the capsule. They will considerably extend the range of tracking radars by responding to and retransmitting a strong signal to the ground stations, he added.

NASA said the objectives of Project Mercury are to put a manned space capsule into orbital flight, to successfully recover the capsule and its occupant and to investigate the capabilities of man in this new environment.

A High-Speed Microfilm printer capable of recording computer output data on microfilm at the rate of 15,000 characters per second, has been announced by Stromberg-Carlson of San Diego.

The newest member of the S-C 4000 series, the S-C 4020 has potentially broad applications in the fields of graph plotting, tabular printing, design engineering and computer monitoring.

According to the company, use of the new printer results in substantial savings of time, paper, forms inventory, storage space and shipping costs in microfilming tabular data, and will eliminate the need for clerks to read computer output data in order to plot graphs by hand.

The S-C 4020 differs from other printers in the S-C 4000 series primarily in that it is compatible with a wide variety of data processing systems and is capable of either on-line or off-line operation at the discretion of the operator. Previous printers were designed exclusively for on-line use with specific computer installations.

High-speed microfilming is accomplished by combined use of a Charactron-shaped beam tube and a 35mm recording camera, in addition to the necessary logic circuitry. The tube receives the computer output data and generates the appropriate characters on graph points, displaying them on the tube screen at the rate of 15,000 per second. The camera photographs the information as it appears on the face of the tube, recording the data on microfilm.

The S-C 4020 is a single, compact unit with dimensions 66" wide, 34" deep and 72" high.

Leo A. Hoegh, Director, Office of Civil and Defense Mobilization and Willard F. Libby, Commissioner, U.S. Atomic Energy Commission reing the development for home use of an inexpensive, simple and effective device to detect and measure radioactive fallout. Since August 1957, the Atomic Energy Commission and the Office of Civil and Defense Mobilization have been working together toward this development.

"It is an established policy," the statement continued, "of OCDM that every home should have a battery radio set. Also, research carried out during the last year or more by the AEC and OCDM has included attempts to perfect a radiation detection device which could be combined with a battery radio hopefully at an additional cost of not more than $5 to $10.

"The present general popular trend toward transistor radios, which are both portable and battery powered, may, if the instruments are available at modest cost, result in the introduction of fallout detection instruments into millions of homes. This would greatly strengthen our civil defense against nuclear attack.

"Several companies have developed such radio radiation dector combinations which are being considered. When such combinations are tested and approved for performance and low cost, the AEC and OCMD will strongly recommend them to the public. It is hoped that successful devices can be developed at an early date.

"The radio-radiation detector would provide in one convenient package two essential survival services: (1) Receipt of broadcast information and civil defense instructions, and (2) Determination of the presence and degree of radioactive contamination.

"Ideally, in addition to a family fallout shelter, every American home eventually will be equipped with a battery powered radio and a simple inexpensive device for measuring radiation hazard whether combined in one instrument or separate. Meanwhile, federal agencies and state and local governments are developing a capability for detecting and measuring radioactivity.

"At this date more than 88,000 city, state and federal employees have been trained to operate the radiological instruments which OCDM has been delivering for this purpose. Through them, local governments, states and the federal government can determine fallout hazards and inform the public by radio. The individual family radiation detector would strengthen this general warning service."

Splitting Atoms or distant stars can now be "seen" by a new image intensifier tube which amplifies the light entering at one end to produce an image as much as 3,000 times brighter on its fluorescent screen at the opposite end.

Developed by the Electronic Tube Division of Westinghouse Electric Corp., the tube's most important use is expected to be in the nuclear field where it will permit photographic records of atomic particle reactions.

In astronomy, the tube can intensify further the output of giant telescopes when viewing very faint stars.

In a satellite it could be used to obtain pictures of far distant stars and galaxies.

The tube is said to be able to reintensify its own output by leading the light output back through the tube with a system of mirrors. Four of the tubes feeding into each other with lenses would be able to produce a picture of a single photoelectron.

By 1963, Goodyear Aircraft Corp. says it can have a nuclear-powered blimp in operation which would be three times the size of airships currently used by the Navy to watch for submarines and warn against air attack.

In describing the blimp, company officials said it would be capable of traveling about 90 miles an hour at an altitude of 10,000 feet. The reactor would be placed amidship the 540 foot long airship and be situated at such a distance from the craft's control car that personnel aboard the blimp would work under conditions similar to those in an atomic plant.

Goodyear said the airship's buoyancy would enable the craft to travel with considerably less power than required by conventional aircraft. According to the company, a nuclear-powered blimp could be fitted with the reactor with only 1-20 the power needed to run a nuclear-powered conventional plane.

A new rubberized fabric, Goodyear said, capable of withstanding radiation would be available for construction of such a blimp,—if the Pentagon approved the project.

A Pulse Transformer which can operate from the deepest point of the ocean has been developed by Edgerton, Germeshausen & Grier, Inc., of Boston, Mass.

The transformer, used to supply pulse energy to sonar transducers, has been designed to withstand the 15,000 pound per square inch pressure found at 36,000 feet below sea level.

Reported to be capable of delivering a peak pulse voltage of 8,000 volts, the transformer is mounted in an oil-filled Plexiglass container with neoprene rubber end plugs. By oil filling under vacuum to exhaust the contained gases, the unit becomes a solid mass and should be able to resist the tremendous pressures encountered at depths of six miles.

Due to its low duty cycle, the pulse transformer is said to have little or no heating problem. The dimensions of the transformer are: diameter, 2½", length, 11".

Lt. Gen. William F. McKee, Vice Commander of Air Materiel Command, declared recently that the Air Force, its contractors and major subcontractors must be ingenious in developing methods to bring more small businesses into Air Force production.

General McKee said, "We are talking about the many small, competent concerns that have the capabilities we need, but which, because of their size, are too often passed by and not afforded the opportunity to make the contributions to our production for which they are qualified.

"We had considered in the Air Force that we had established methods by which qualified small concerns would not be overlooked. But we find it necessary now to correct certain deficiencies in our procurement procedures and to increase our efforts to afford equitable opportunities for small concerns to participate as prime contractors."

In addition, he said, "We must not fight change in our procurement practices, but must modernize them also to meet today's situation. I want to emphasize that quality, timely delivery and a fair price are still the prime requirements of proper procurement."

It has been alleged that the Air Force's weapon system concept might have a drastic effect on the number of opportunities afforded small business, and that prime contractors who formerly gave out a large share of their work in subcontracts to small business, now are tending to develop subsystems in their own plants or those of major subcontractors.

To insure, to the maximum extent practicable, that this does not happen, the Air Force is extending its small business program to reach the lower tiers of contractors, according to M. L. Johnson, AMC's Executive for Small Business. For this purpose, it is necessary that contractors adopt within their purchasing practices certain procedures that the Air Force has proved to be mutually beneficial for itself and small business in the Air Force's own direct purchasing, he added.

A Guide to Photography of the heavens for photographers and amateur astronomers is now being offered by the Eastman Kodak Co. The 16-page booklet "Astrophotography With Your Camera," (G-20), spells out the principles of astronomical picture-taking and exposure determinations and offers detailed recommendations on the necessary equipment.

After an outline of the ways to capture star trails, meteors and aurorae on film with stationary cameras, there are complete sections on astrophotography with guided cameras and telescopes. Diagrams and text explain how to construct a simple mounting device for the camera.

Separate tables include information on the occurrence of meteor showers; the approximate number of stars that can be "seen" by the human eye, one-inch and two-inch lenses; general exposure recommendations for amateur astrophotography; Kodak films and plates that can be used, and a checklist of considerations involved in exposure determination with any optical system.

Free copies of the booklet are available from the Sales Service Div., Eastman Kodak Co., Rochester 4, N.Y.

First U.S. Public Demonstration of a new electronic "sky-writing" radar system that keeps tabs on fastest jet and conventional aircraft flights was made at the AFCEA Convention by the Raytheon Company.

The "sky-writer," a combination of the most advanced radar and television techniques, presents a continuous flight path of aircraft—showing the plane's direction, speed and position simultaneously.

In use, the system is expected to help ground controllers speed the flow of air traffic between American cities.

Scheduled for use soon by Canada's Department of Transport, the "sky-writer" also will make it easier for ground controllers to note any unusual situation as it develops and act to prevent emergencies.

Helping to make the "sky-writing" technique possible is a new Raytheon-developed two-gun storage tube. The "pips" or momentary radar images seen on conventional radar presentations, are stored each time the antenna sweeps the skies.

The screen shows a continuous line of these dots or pips, to form the plane's actual path. An electronic map on the scope helps pinpoint the plane's position over an area.

The new storage tube also makes it possible to view the flight path in a brightly lit room instead of the semi-darkness needed for conventional radar viewing.

An Interpretation of the FCC Rules and Regulations affecting mobile communications effective September 11, 1958 is now available from Kaar Engineering Corp.

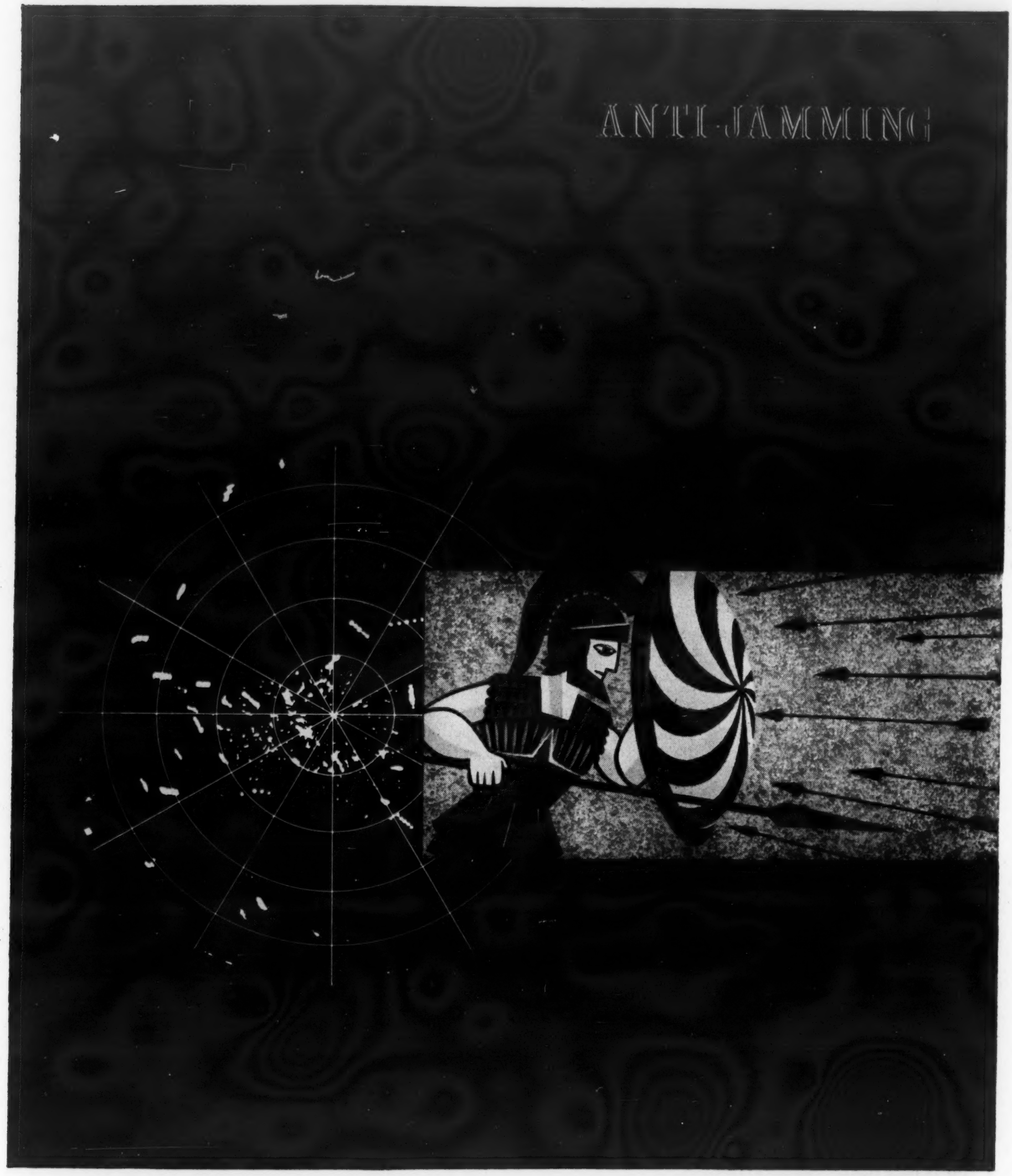
The brochure covers all frequencies available in business radio, manufacturer's radio, telephone maintenance radio, public safety radio and citizens radio. They are listed with the respective conditions and provisions for their use in an easily readable tabulated form.

Free copies are available from Kaar Engineering Corp., 2995 Middlefield Road, Palo Alto, Calif.

A Device that Produces electricity directly from gaseous fuel has been developed in a "new, improved form" by General Electric scientists, Dr. Guy Suits, GE vice president and director of research announced.

The fuel cell generates electricity by means of a chemical reaction. In the present version, hydrogen and oxygen produce an electric current, with water as a by-product.

The model, developed by Dr. W. Thomas Grubb and Dr. Leonard W. Niedrach, consists of a round plastic disk about one-half inch thick and three inches in diameter. Its hollow interior is divided into two chambers by a special plastic membrane, which has an electrode in contact with each of its sides. Hydrogen is fed into one chamber and oxygen into the other (or oxygen in the air can be used). At one electrode, the hydro-



the picture is clear. Operational hardware to combat the gamut of radar jamming exists now at Bendix Radio. It enables targets to be detected despite natural and man-made interference. Jamming can even be turned to your *advantage*. Some of our fixes are unclassified. Others can be discussed on a need-to-know basis. If you have radar jamming problems, contact us to learn of our developments. Demonstration of equipment in operation also can be arranged.

Bendix Radio Division

GOVERNMENT PRODUCTS • BALTIMORE 4, MARYLAND

Bendix AVIATION CORPORATION

gen molecules break up into electrons and positively charged hydrogen. The electrons travel through an external circuit to the other electrode, thus creating an electric current. The positively charged hydrogen moves through the membrane to the other electrode, where it combines with oxygen and the electrons from the external circuit to form water.

The new device operates efficiently at room temperature and normal atmospheric pressure. Thermal efficiencies over 60 per cent have been obtained.

"The fuel cell may find both civilian and military uses," Dr. Suits said, "despite the fact that it produces low-voltage direct current. We cannot yet determine how competitive it will be with other power sources, but its special characteristics may well fit it for a variety of uses. It is likely that the present cell will be useful for specialty applications, rather than for the production of large quantities of power for general distribution. Military and space vehicle applications might make use of the fuel cell's high reliability, simplicity, portability, light weight and small volume."

An Automatic Flaw detection device is being developed by the Southwest Research Institute in an effort to improve the safety of natural gas systems and to insure reliable and continuous service to gas consumers. The majority of undetected flaws lies within the wall of the gas pipe and is therefore invisible. Thus an inspection system, that is fast, automatic, cheap and reliable, is needed to supplement visual inspection.

The development program, being carried out for the Southern Gas Association has produced a device which utilizes ultrasonics for non-destructive testing on a laboratory scale. In addition to ultrasonics, however, known methods in other fields of non-destructive testing such as radiographic and magnetic techniques are expected to be utilized in the final system.

The ultrasonic device beams a pulse of high frequency sound at the pipe and detects the reflections caused by flaws, and is expected to be expanded to handle many sizes of piping at high speed and will contain electronic circuitry so designed to recognize and classify defects automatically. The device will be used to inspect pipe in gas company stock piles and just prior to installation as a supplement to inspection by the factory.

It is estimated that the basic circuits and mechanisms necessary to construct a complete automatic inspection device suitable for a field trial should be finished within the next year.

A Radio Beacon designed to withstand shocks of over 5000 g applied in any direction has been developed by the General Electric Co. for use in recovering data capsules after free-falling 25,000 feet from a re-entering nose cone.

Signals from the beacon have been picked up at over 100 miles. With a peak output of 15 watts, the beacon operates in the UHF frequency band, but can be modified to other frequencies.

The beacon weighs 18 ounces and is powered by mercury cells. A two-pound power supply lasts for one and one half days of continuous operation.

So far, the beacon has been used by G. E.'s Missile and Space Vehicle Dept. in locating data capsules used in the nose cones of Thor and Atlas missiles. Other projected uses are for homing devices, renewal buoys and distress aids.

The National Inventors Council, U.S. Department of Commerce, is asking the help of the nation's civilian inventors in producing 28 new devices or systems needed by the Armed Forces.

Inventions needed range from a "Buck Rogers" type of rocket lift device (which can be worn by a man to shoot him across difficult terrain or to ease him down to earth from an airplane) to small new instruments and electronic components.

The National Inventors Council, composed of civilian scientists and engineers and the heads of research of the Army, Navy and Air Force, serves as liaison agency between the civilian inventor and the military. Since 1940, it has been "capitalizing on the brain-power of the American public to solve military technical problems."

The 28 new ideas needed, plus five revised problems, are listed in "Supplement to Technical Problems Affecting National Defense," which can be obtained with the basic list of older, still unsolved problems by writing to NIC, U.S. Department of Commerce, Washington 25, D.C.

The Transportable Tracker, a new tracking antenna offers three important features: a folding 28-foot reflector, hand-operated el-az drive system and self-contained trailer mount and tower.

The reflecting surface is a special reflective cloth which folds compactly, and the ribs of the reflector are hinged around the center section. When the reflector is collapsed and the supporting pillar is lowered onto the flat trailer bed, the antenna is easily towed to another location.

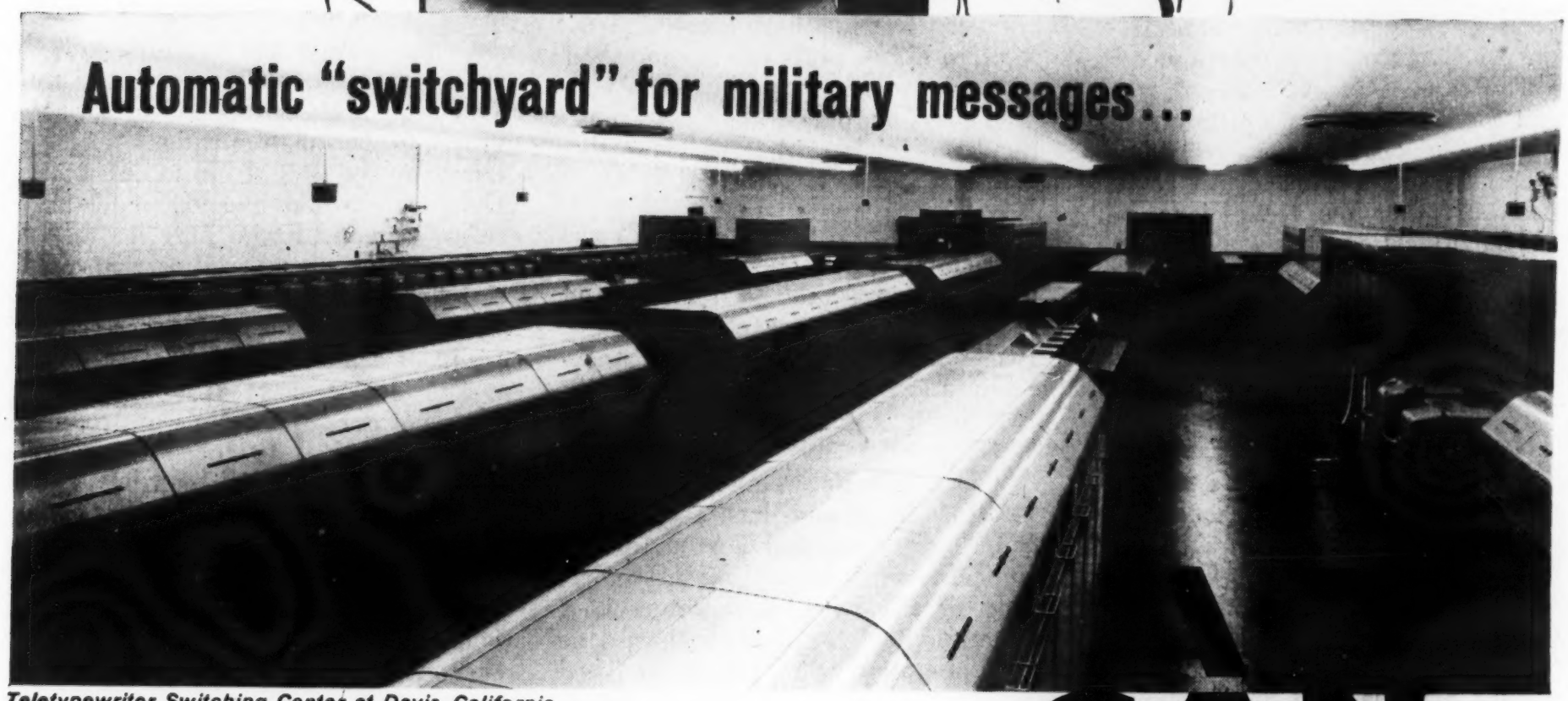
While the elevation and azimuth drives are intended to be operated by hand, motors and selsyns can be added.

The antenna is designed and manufactured by D. S. Kennedy & Co., Cohasset, Mass.

U. S. Department of Commerce Coast and Geodetic Survey scientists are studying microseisms (earth vibrations) that have been recorded constantly in Antarctica during the International Geophysical Year and its continuation. As the vibrations usually are not carried across geological discontinuities (gaps), the findings may confirm or disprove the theory that the land mass is not a single continent but divided.

The Survey operates IGY seismic

Automatic "switchyard" for military messages...



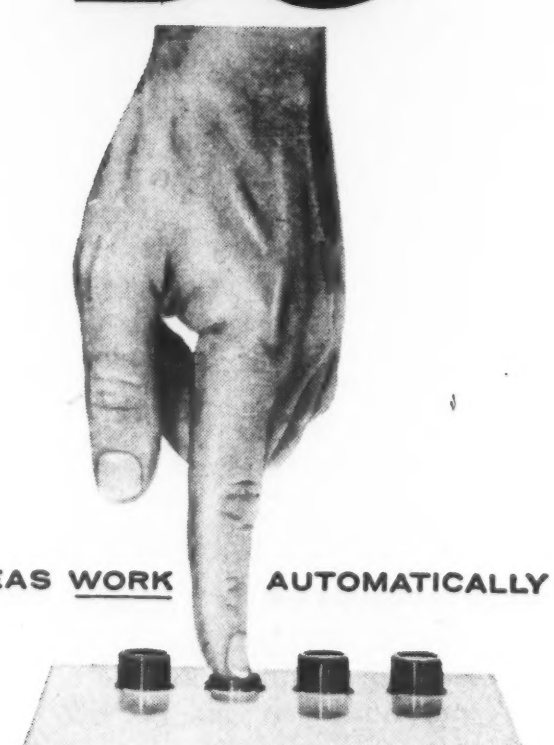
Teletypewriter Switching Center at Davis, California

AE has developed the switching techniques and control devices that automatically route messages to the proper commands, give instant priority to emergency traffic.

Messages arrive at Teletypewriter Switching Centers on coded tape. The codings indicate whether messages have a single or multiple destination, where they are to go, and the degree of their priority. AE automatic switching systems do the rest.

Switching such as this is AE's business. If you have a tough project in communications or control, AE is ready to take it on. Just write the Manager, Government Service Division, Automatic Electric Sales Corp., Northlake, Illinois.

AE CAN DO



AUTOMATIC ELECTRIC MAKING IDEAS WORK AUTOMATICALLY

Subsidiary of
GENERAL TELEPHONE & ELECTRONICS

stations at the South Pole and at Byrd Station. The seismologists making the study are borrowing similar records from Mirny and Vostok stations operated by the Soviet Union; Halley Bay station operated by Great Britain; Scott Base operated by New Zealand, and Mawson station operated by Australia.

Microseisms and earthquakes are recorded on the same instruments (seismographs). The microseisms are too minute to be felt by man but show as irregular lines on the chart.

The origin of most microseisms appears to be in storms at sea. They show clearly on seismographs at or near the coast. At times this background irregularity of the lines on the chart makes it difficult to read the record of earthquakes themselves. For this reason, seismographs in Washington, D.C., and other areas near the ocean are not entirely satisfactory for earthquake recording. They have to be adjusted to a coarse scale, or what the technicians call low magnification.

A grant from the National Science Foundation is supporting the microseism analysis.

• • •

New Anti-Multipath Equipment (AME) had its first public showing at the AFCEA Convention. The Research and Development division of Page Communications Engineers, Inc. worked for nearly three years developing the equipment. It is easily adaptable to many communications systems with a minimum of modification.

Message errors in conventional point-to-point radio systems may occur if the signal travels to the receiver by two or more paths with different times of arrival. The signal component which was delayed can then interfere with succeeding letters in the message and cause errors.

AME provides errorless copy by a frequency-changing technique which moves the transmitted and received frequency before the delayed signals are received. During the past year, AME has proved successful on military circuits across the North Atlantic. In the Arctic, it has been effective in eliminating the effects of multipath echoes on U.S. Air Force ionoscatter FSK communications circuits.

• • •

A New Electronic Unit that senses the presence of liquids and any change from liquid to gas or vice versa is being placed in production by the Pioneer-Central division of Bendix Aviation Corporation.

Orders for the sensor—basically a light switch with a light source, optical prism, solar cell, miniaturized transistor amplifier and a relay—have been received by Bendix from The Martin Company-Denver facility for use on the Titan missile. An evaluation order has been received from Convair for ground support equipment used with the Atlas missile.

In addition to its use as a liquid flow control signal for missile ground support equipment, it can be used in diversified test devices; as a component in fuel and oxidizer control systems to fill tanks and provide complete utilization of fuels and oxidizers in flight, and for stage separation of missiles when fuel has been completely used. Also, units can be installed on tanks to sense liquid levels for rate of filling or per cent of capacity, Bendix officials said.

• • •

Ericofon, a new one-piece dial telephone, has recently been introduced to the American market by the L.M. Ericsson Telephone Co. of Stockholm, and is distributed in the U. S. by North Electric Co. of Galion, Ohio.

The telephone weighs 15 ounces, is 9¼" high and has a 4½" by 3⅞" base. The dial portion of the one-piece set is located on the underside of the Ericofon base as is a "Standswitch" which puts the phone into operation when the set is lifted for use. When the call is completed, the user hangs up by putting the set back on the desk.

The receiver is sealed inside the upper part of the case; the transmitter is located in the inside lower front part of the base. The set has a combination straight and coiled cord, allowing the phone to be carried nearly seven feet from its terminal.

• • •

The Air Force's Dawsonville, Ga., laboratory for testing atomic aircraft systems is now in operation and more than 50 other governmental agencies are interested in using the facility to test effects of radiation on systems and components.

The Air Force and Lockheed Aircraft Corporation's Georgia Division said the main reactor at the Georgia Nuclear Laboratories (Air Force Plant No. 67) has been under testing for the past five months—with safety and success. General Electric built the reactor.

First testing of aircraft systems and components in the nuclear environment was scheduled to get underway in June.

The Air Force has made the laboratories available for radiation effects tests for other government agencies or their contractors. Immediately after this offer was made, Lockheed Nuclear Products Branch reported receiving more than 50 inquiries from agencies or their contractors. They included queries on use of the facility in such widely diverse fields as electronics, hydraulics, magnetics and chemical propellants.

• • •

Presence of Radioactivity is being simulated in a new device to avoid the dangers of handling radioactive material while training personnel in decontamination and handling radioactive material. Being developed by Tracerlab Inc., the device should prove to be of tremendous importance in the safe training of Civil Defense, military and industrial safety personnel who may be called upon to clean up radioactive material spilled as the result of an accident or dumped on large areas as the result of a nuclear attack.

The device acts on simple nontoxic powders and liquids to produce effects identical to those of radioactive materials which can be registered on standard radioactive detection devices such as Geiger counters, scalers and ratemeters.

According to an official of the company, it will now be possible to demonstrate radioactive material even in grammar school and high school science classes.

• • •

A Tiny Cooling Device which superchills infrared detection equipment to 60° Kelvin (—350° Fahrenheit) by a new refrigerating technique has been developed by research engineers at Arthur D. Little, Inc. of Cambridge, Mass.

The 8-ounce min-IR-cooler is expected to be a significant scientific achievement in support of military and civil aviation. The result of a two-year pioneering research project into extreme low temperature equipment, the min-IR-cooler should be ideal for airborne operation in missiles or airplanes.

The designers pointed out that cooling infrared detectors to extremely low temperatures increases their sensitivity and makes them responsive to a wider range of IR wave lengths. This makes it possible to detect small temperature differences between the "target" and its surroundings.

How to color code plastic insulated telephone wire at 2000 feet per minute

Cables used in telephone central offices contain hundreds of wire conductors which must be identified and connected to their corresponding terminals. To take advantage of the superior qualities of plastic — which is replacing textiles as insulation for wires used in these cables — a way had to be found to color code the plastic. The use of solid colors alone wouldn't do the job since there were not enough different colors.

Some time ago, Bell Telephone Laboratories suggested a coding system of colored dots and dashes, and asked Western Electric to develop a means of applying these markings.

Ink jets from spinning disks produce dash code on plastic covered wire, as shown.

Our engineers decided to place the coding operation at a point where the wire emerges from the extrusion machine with a hot, semi-hardened coating of polyvinyl chloride . . . before it reaches the cooling trough and take-up reels. Since coding had to be done at a speed of over 2000 feet per minute — to match that of the production line — the relatively slow contact printing devices then available were not satisfactory. In addition, contact printing itself was undesirable because the coding instrument might damage the soft plastic as it came from the extruder. In short, there were no machines available that would code plastic insulated wire at the extrusion speeds required by Western Electric.

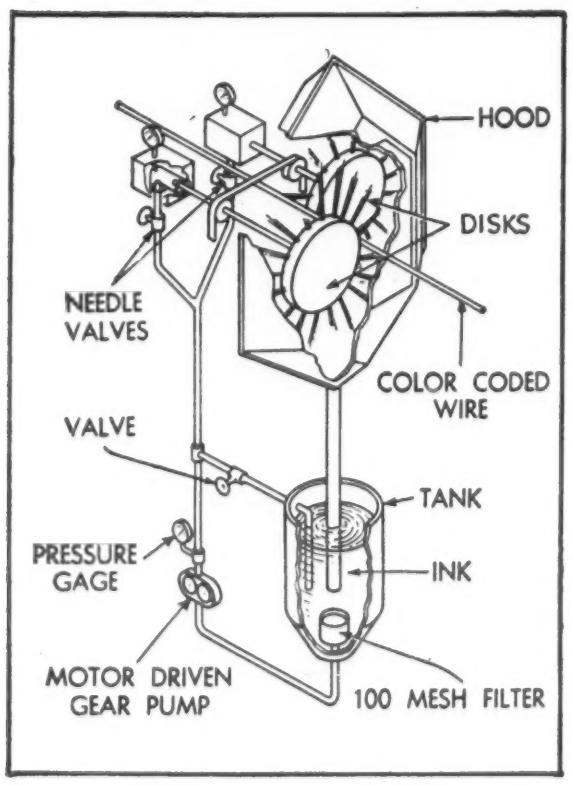
The basic problem in developing a high-speed coding machine was how to apply the marking ink. Initially, trials of a modified paint gun apparatus proved futile due to inability to control the size and location of the ink markings.

A concept for a new machine employing rotary ink ejectors was finally developed. These are hollow motor-driven disks, having removable rims into which .018″ holes are drilled in desired combinations.

To color code both sides of the wire, two of these spinning disks are placed in tandem and the wire passes between them. It passes close to the outside rim of each disk and ink fed into the hollow of the disks is forced out in radial streams, impinging on the plastic wire coating. By varying the arrangement of holes in the rims it is possible to apply various combinations of dots to the rapidly moving wire. Dashes are recorded by drilling holes in the rims so close together that the dots on the wire merge into a dash before the ink dries.

By simply changing the rims, it is possible to switch from one code to another. To shift ink colors, the system is flushed with a cleaner and the new ink added. The ink supply can be varied to suit the speeds of the wire and the disks.

The development of this machine permits the production of color coded plastic insulated wire at high extrusion speeds. It is one more step in the constant improvement of telephone equipment made by Western Electric as manufacturing and supply unit of the Bell System. This is another example of the way Western Electric's engineering ingenuity continues to bring you dependable telephone service . . . at low cost.



Schematic drawing of color coding unit.

Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

Names in the News

Fred W. Wolcott, formerly Assistant to the Chief Engineer for Advanced Engineering Planning, Douglas Aircraft Co., Long Beach Division, has been named a Special Assistant to the Director of Defense Research and Engineering.

Frank A. Parker, formerly Director of Technical Developmnet of American Radiator and Standard Sanitary Corporation, has been appointed Assistant Director of Defense Research and Engineering for Undersea Warfare. Mr. Parker joined the staff of the President of American Standard in New York City early this year.

Brigadier General Wesley T. Guest, Commanding General, Sacramento Signal Depot, Sacramento, Calif., will retire July 31 after more than 38 years active service.

Thomas V. Jones, who was formerly Senior Vice President, has been elected President of Northrop Corp. Mr. Jones succeeds the late Whitley C. Collins.

George T. Scharffenberger has been named a Vice President of Litton Industries, Inc. Formerly President of Kellogg Switchboard and Supply Company, a division of International Telephone and Telegraph Corporation, he has assumed the duties of President of Westrex Corp., a Litton division.

Col. Fred J. Elser, Special Assistant to the U.S. Army Signal School Commandant, was presented the Army Commendation Ribbon with Metal Pendant at Ft. Monmouth recently. Col. Elser, who retired from the Army on May 31, was especially cited for his work with the Signal School's Board of Visitors, the Allied Senior Signal Officer Orientation/Observation tour and studies he has made for the school. He also received a Certification of Appreciation, signed by the Army Chief of Staff.

Donald C. Power, Chairman of the Board and Chief Executive Officer of General Telephone & Electronics Corporation, was named "Business Executive of the Year" at the 24th Annual International Distribution Congress of National Sales Executives-International. Previous recipients of the honor have included Benjamin F. Fairless, Neil McElroy, Clarence Randall, Charles E. Wilson, Charles F. Kettering and Paul Hoffman.

IRE Salutes Government Research

Again government projects make the news as space satellites relay world weather data and rockets orbit the sun. The *Institute of Radio Engineers* salutes government contributions to progress in radio-electronics in the *Special May Issue* of **PROCEEDINGS OF THE IRE.**

The big May **PROCEEDINGS OF THE IRE** gives deserved recognition to the government laboratories and bureaus engaged in electronics research and development, and brings to its readers information about the invaluable work being done by engineers and technicians in federal employ. Included are 40 technical papers dealing with the most important aspects of current projects.

Radio-Electronics Behind the Headlines

This Special Issue reveals how the government is meeting the challenge of creating new and better electronic devices for peaceful and utilitarian purposes, as well as how it is meeting the pressing need for advanced national defense systems. Also discussed are future safeguards for the security of the free world.

Presentation of this special issue on *Government Research* is in keeping with the IRE's policy of bringing to the world of radio-electronics the latest news of subjects of special interest and significance. Such a practical policy enables the IRE to provide a valuable service to the industry by making technical material and pertinent information available not only to its 72,000 members, but to informed non-members as well.

Read this informative report on *Government Research* in the publication that records progress. If you are not a member of the IRE, be sure to reserve a copy of the May **PROCEEDINGS,** now.

PARTIAL CONTENTS OF THIS GOVERNMENT RESEARCH ISSUE:

"The Basis of Our Measuring System" by A. G. McNish, National Bureau of Standards

"The DOFL Microelectronics Program" by T. A. Pruge, J. R. Nall & N. J. Doctor, Diamond Ordinance Fuze Labs.

"VFL Propagation Measurements for the Radux-Omega Navigation System" by C J. Casselman, D. P. Heritage & M. L. Tibbals, U. S. Naval Electronics Lab.

"Submarine Communication Antenna Systems" by R. W. Turner, U. S. Naval Underwater Sound Lab.

"Some Characteristics of Persistent VHF Radio Wave Field Strengths Far Beyond the Radio Horizon" by L. A. Ames, E. J. Martin & T. F. Rogers, Air Force Cambridge Research Center

"Phenomena of Scintillation Noise in Radar Tracking Systems" by J. H. Dunn, D. D. Howard & A. M. King, U. S. Naval Research Lab.

"On Models of the Atmospheric Radio Refractive Index" by B. R. Bean & G. D. Thayer, National Bureau of Standards

"Image Intensifiers and Image Converters for Military and Scientific Use" by M. W. Klein, Engineering Res. & Dev. Labs.

"A Light-Weight and Self-Contained Airborne Navigational System" by Staff, Defense Research Board, Canada

"The CAA Doopler Omnirange" by S. R. Anderson & R. B. Flint, U. S. Dept. of Commerce

"Pulsed Analog Computer for Simulation of Aircraft" by P. N. Herzog, U. S. Naval Training Device Center

"Progress and Problems in Army Communications" by R. E. Lacy, U. S. Army Signal Res. & Dev. Labs.

"The Engineering of Communication Systems for Low Radio Frequencies" by J. S. Belrose, W. A. Hatton, C. A. McKerrow & R. S. Thain, Defense Research Board, Canada

"Numerical Approach to Electronic Reliability" by J. J. Naresky, Rome Air Development Center

through SIGNAL's *direct report from the first demonstration of Raytheon's Sparrow III, the Navy's newest air-to-air missile. This is but one of the many important scientific advancements in the electronics and communications fields that* SIGNAL *covers and makes available to its readers. By reading* SIGNAL, *you become familiar with the forward thinking of leaders in military and industry.*

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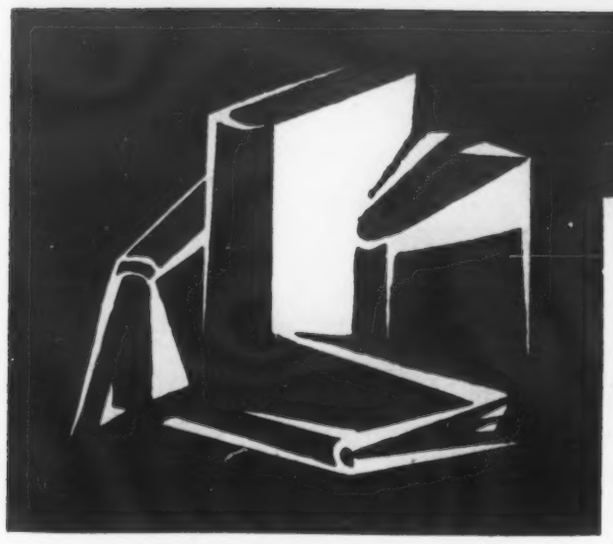

Books

THE RADIO AMATEUR'S HANDBOOK, (36th Edition, 1959). The American Radio Relay League. 746 pages. $3.50.

The standard manual of amateur radio communication once again has been revised and restyled in the light of current needs as a radio construction manual, reference work and training text.

The sections on the theory of radio communications have been brought up to date, and material on the construction of equipment includes new designs in all the categories. Receivers for both the beginner and the advanced constructor, and transmitters for every level of power and frequency range are described.

Special methods of amateur communication, such as sideband and radio-teletype, are treated in sufficient detail so that any student of the art should be able to understand the basic principles. The theory and practice of mobile radio equipment are covered thoroughly, including the fundamentals of transistor power supplies.

The *Handbook* also contains a large catalog section, featuring communications equipment of the nation's leading manufacturers, and over 1300 illustrations.

KOGUN: The Japanese Army in the Pacific War, by Saburo Hayashi in collaboration with Alvin D. Coox. The Marine Corps Association, Quantico, Va., 1959. 249 pages, $4.50.

From all that has been written about World War II, and specifically the Pacific, very little of importance has emerged (with the exception of the Pearl Harbor attack) stating the Japanese viewpoint. Saburo Hayashi, a former colonel on the Imperial Japanese Army General Staff, fills this gap by not only presenting high-level command plans and policies, but by analyzing the prewar background of Japanese militarism and its significant trends.

Concerning the actual conduct of the war, the author discusses the following problems: How did the army high command estimate the situation throughout the Pacific War? On what thinking was its plans of operations founded? How did the high command actually conduct its operations?

From this framework a clear picture develops of high command errors in its estimates of the situation, in mismanagement in the conduct of operations and internal disagreement on basic policy.

THE THIRD WORLD WAR, by Harry Welton. Philosophical Library, 1959. 330 pages, $6.00.

This is a story of Russia's economic, political and psychological offensive against the West by an author who, over the years, has studied it from every aspect.

According to the author, the third world war is already in progress, but the weapons are not missiles or bombs, or even conventional guns and aircraft; rather they are saleable commodities such as, cars, tractors, power stations and steel mills.

The armies are not military soldiers but the millions of people working under almost military discipline in Russia and her satellites, high-pressure salesmen, propagandists, and technical experts.

DICTIONARY OF GUIDED MISSILES AND SPACE FLIGHT, Edited by Grayson Merrill. D. Van Nostrand Co., Inc. Princeton, N.J., 1959. 688 pages, $17.50.

The most commonly used terms in the guided missile and space flight fields today are defined in this dictionary. Included are terms pertaining to current and historical guided missiles and spacecraft; their systems used for guidance and control, propulsion, armament and launching; the components of these systems, and all related terms. Types of antennas, circuits, radar systems and propellants are also described.

Detailed explanations, illustrations and a comprehensive cross-reference system are provided where they are felt to be necessary to attain further clarity and understanding.

For those working in the field, both civilian and military personnel concerned with research, design or operation of guided missiles and spacecraft, this volume should prove invaluable.

THE ATLANTIC CABLE, by Bern Dibner. Burndy Library, Norwalk, Conn. 1959. 96 pages. In cloth, $3.50; in paper, $2.50.

It was fourteen years after Samuel F. B. Morse telegraphed the historic "What hath God wrought" through 40 miles of overhead wire between Baltimore and Washington that another American, Cyrus W. Field, showed how the electric telegraph could cross oceans as well as continents.

Helped by scientific and technical leaders in America and Britain, subsidies from their governments, and capital from private investors, Field succeeded, by 1858, in laying and operating the Atlantic cable. His first success was short lived, but in 1865 and '66 he laid cables that were to function effectively.

How Field and his colleagues, American and British, persevered through the years of discouraging failure and tantalizing near-success to achieve their final triumph is told engagingly in *The Atlantic Cable.* Its readable text and 54 contemporary illustrations bring back to life the men—with their ships, machinery and instruments—who conceived, financed, engineered, manufactured, laid and operated the first Atlantic cables.

THE FAILURE OF ATOMIC STRATEGY, by F. O. Miksche. Frederick A. Praeger, New York City, N.Y. 224 pages. $4.50.

Under what circumstances is atomic warfare likely to break out? Is it possible for the Western world to defend itself against a future atomic attack? Colonel F. O. Miksche, a military theorist who has written several other books, sets forth some answers to the above questions.

It is Colonel Miksche's belief that the West is in a state of "atomic paralysis." This paralysis, according to the author, is unrealistic in the light of our manpower reserves, our wealth of raw materials and our highly efficient systems of production. To conquer this paralysis, Colonel Miksche presents a plan by which the West could seize the initiative in the present atomic stalemate and put into operation a plan based on realistic strategy.

The author, who was attached to the headquarters of the Free French Forces during World War II and later was liaison officer on General Eisenhower's staff at Versailles and Frankfurt, weighs the possibilities of air defense in nuclear warfare and demonstrates how armies of the atomic era can be made more efficient.

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Personnel Available

As a service to AFCEA members, SIGNAL will make space available in this column for those members who are interested in employment in the communications, electronics and photography industries. Any member is entitled to three insertions in the magazine on a space available basis, free of charge. Please limit your notice to 5 lines. In replying, employers are asked to address: Box ——, SIGNAL 1624 Eye St., N. W., Washington 6, D. C. Letters will be forwarded to the AFCEA member.

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Chapter News

(*Continued from page* 51)

to the Defense of Our Country?"

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DYNA-SOAR

Dyna-Soar (for dynamic soaring) is a joint project between the Air Force and the NASA, and is an attempt to solve the technical problems of manned flight in the sub-orbital regions. Advance knowledge on the project indicates how a boost-glide vehicle can operate from the outer fringes of the atmosphere where it can maneuver and be recovered undamaged. Studies show that by varying the original rocket boost, and thus the velocity, and with the control available to the pilot, the Dyna-Soar aircraft can circumnavigate the earth, followed by a normal and controlled landing. Boeing Airplane Company, one of the competing companies for the development contract for the complete boost-glide system, has delegated to RCA the responsibility for the development of important electronic components of Dyna-Soar.

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BL-226	5.0	0.5	1300 V	0.9	100	9100–9500	50Ω TNC Plug	8 oz.	X
BL-227	5.0	0.5	1300 V	0.9	100	8700–9100	50Ω TNC Plug	8 oz.	X
BL-228	5.0	0.5	1300 V	0.9	100	8300–8700	50Ω TNC Plug	8 oz.	X
BL-230	5.0	0.7	2800 V	1.9	1000	5400–5900	50Ω TNC Plug	10 oz.	C
BL-231	5.0	0.5	1450 V	1.0	200	5400–5900	50Ω SM Jack	8 oz.	C
BL-233	5.0	0.7	2800 V	1.5	1000	9375	UG 40/U	11 oz.	X
BL-242	5.0	0.7	1900 V	1.1	400	5400–5900	TNC or 50Ω N Plug	10 oz.	C
BL-243	5.0	0.5	1450 V	1.0	200	5400–5900	50Ω SM Jack	8 oz.	C
BL-245	5.0	0.7	2800 V	1.9	900	5400–5900	50Ω TNC Plug	10 oz.	C
BL-247	5.0	0.5	1200 V	0.8	100	9100–9500	50Ω TNC Plug	8 oz.	X
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